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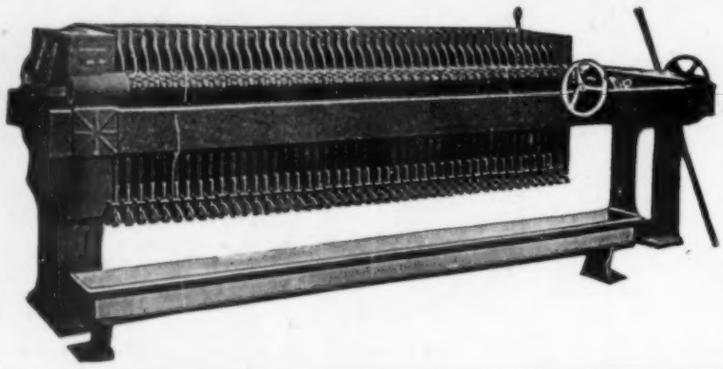

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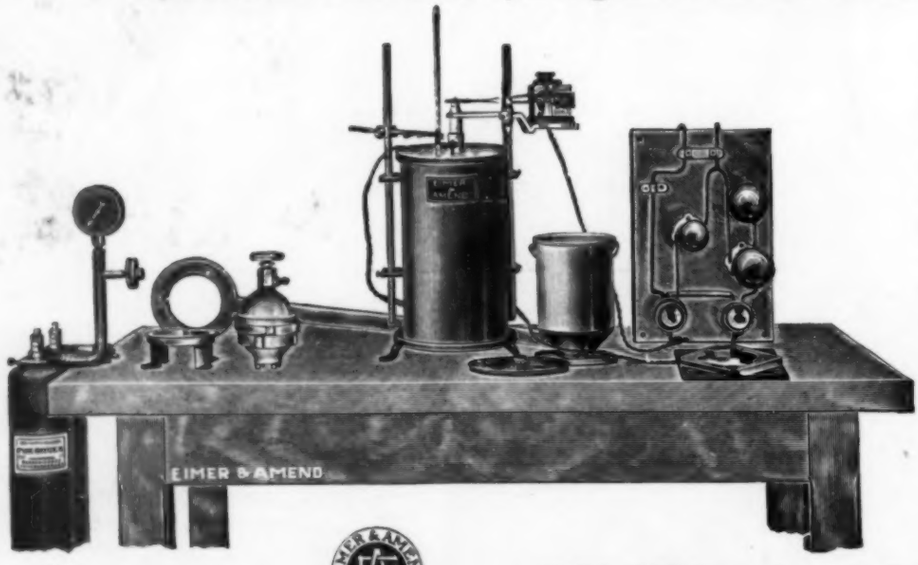

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CHEMICAL & METALLURGICAL ENGINEERING

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H. C. PARMELEE
Editor

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Pershing and Chemical Warfare

WHEN General John J. Pershing retired last September as Chief of Staff of the United States Army, he made a final report to the Secretary of War, which has just been released for publication. It may be supposed to embody not only his major hopes and aspirations for the army, which he reorganized on his return from France, but also his critical judgment and opinion of the value of the various arms of the service. Approaching the report in this attitude, one looks in vain for any reference to the Chemical Warfare Service, and finds, in a report of 6,000 to 7,000 words, only a meager reference of less than 100 words to the "claims as to poison gases." Apparently the General has given a studied neglect to the whole subject. He reviews at length the regular army, National Guard, organized reserves, Reserve Officers Training Corps and Citizens Military Training Camps. He gives attention to our deficiency in all closses of material and supplies, discusses war-time procurement, the air service, promotions for merit, significance of defense test day, and even recommends that the chiefs of combatant branches —infantry, field artillery, coast artillery, cavalry and air service—be permanent Major Generals of the line of the army. But chemical warfare receives only disparaging mention.

Being a post-mortem statement, so to speak, it is not as significant as it would be if Pershing were still Chief of Staff, but it is indicative of the handicap under which the Chemical Warfare Service has been laboring. We understand that conditions have improved and that the attitude at the top is more sympathetic than it was under the Pershing régime. There is still work to be done, however, for the church is not the only organization in which a fundamentalist-modernist controversy is being waged. The army, too, has its conservatives and progressives, its reactionaries and its men of vision.

Hoover to Remain In the Cabinet

RELIABLE reports indicate that Mr. Hoover is likely to remain in the Cabinet as Secretary of Commerce for another 4-year period. This is indeed welcome news. As a leader of American business for the past 3 years, Mr. Hoover has rendered inestimable service to industry. His constructive achievements are emphasized at the present time by the current publication of his annual report. It is more than a compilation of the routine transactions of the eight bureaus and services through which the department serves the public. Its keynote is the elimination of national waste, which has long been a favorite and ever-recurring subject of discourse by the Secretary. It illustrates, furthermore, the attention given by the department to those broader economic problems that affect the welfare of business and industry as a whole. Unemployment and the business cycle, instability of the bituminous coal industry, development of standard specifications for federal purchases, simplified practice in industrial manufacture, improved housing conditions, and the status of trade associations—all were the subject of constructive effort in the Department of Commerce during the past 3 years. And since the future may be largely measured by the past, we may expect an equally broad program of investigation and achievement during the next 4 years.

It has been characteristic of Mr. Hoover's administration that American business has been encouraged to shoulder the burden of solving its own problems. He has been our greatest exponent of self-control in industry and self-discipline in business as opposed to regulation by legislation that is often unintelligent as well as unsympathetic. The policy of the department has been to encourage, not to force; to lead, not to drive. And the results have abundantly justified the measures. With this policy still in effect, American business can look forward to 4 years of aggressive leadership and sound guidance.

Synthetic Twaddle In the Newspapers

PUBLICATION of the results of the recent researches of Prof. A. Miethe in Germany, who succeeded, according to report, in transmuting quicksilver into weighable quantities of gold, has unleashed a flood of loose talk in the newspapers. The myth about "synthetic" gold has been revived in all its brazen stupidity. A story in a recent issue of the San Francisco *Chronicle* is heralded by the following scare headlines: "Synthetic Gold Their Secret—Two Hold Recipe, but Death Bars Meddlers—Scinece in Race to Riches."

Synthesis, it may be interpolated, involves the union of two or more elements to form a compound. Gold, however made, is essentially an element, not a group of elements. It cannot be manufactured synthetically. Let this pass, however, in our anxiety to learn the "news."

"Behind the sealed lips of two men," the report avers, "may lie a secret akin to the golden touch of Midas. One of them is F. D. Madison, retired investor of Portland. Thirteen years ago he was puttering about in a small assay office in Arizona. Of a sudden there was a deafening explosion. The utensil, which contained ores of baser metals, showed a tiny particle of what Madison believes was the world's first synthetic gold.

" 'It was gold—it stood the test,' Madison said today. 'My partner and I proved in successive experiments that which science said could never be had been. For the sake of those whoe greed might lead them to be

blown to death, I must not give the details of the experiment,' he said."

For the dissemination of this story of the outdistancing of science, of the achievement of the impossible and of the noble reticence of a "retired investor," telegraph wires and operators are occupied, printing machines are kept in motion, and paper, ink and labor are squandered. Small wonder that our forest reserves of pulp wood are being depleted, that an education transcending ignorance in its futility is being acquired by the masses! How long will it be before public opinion demands that the newspapers go to a reputable source for technical information, instead of printing pseudo-scientific thrills and synthetic nonsense?

Uniform Production in Widely Separated Plants

NOT LONG ago it was our privilege to inspect a modern food products plant in New York City. One who has yet to have the pleasure of such an inspection has much to look forward to, for few industries have in recent times developed so many interesting applications of chemical engineering processes and equipment. But the thing that most impressed us as we followed the course of the unleavened dough as it was pressed into biscuits, then conveyed through the ovens to be baked, and finally wrapped and packed by automatic machinery into the familiar 5-cent carton, was this comment from our guide: "Every package of biscuits you see there must be identical not only with every other package made in this factory but with every package made in every one of our many branch factories. Furthermore, the cost of making these biscuits—barring fluctuations in the raw materials—must not vary more than one-tenth of a mill per package for a day's output in all of the different plants."

Here, then, was production that was truly standardized and control that had been refined to a nicety. But how was this accomplished? In this particular instance the credit for the achievement was due first of all to a construction department that provided identical facilities so that a highly developed system of operating control could be practiced by a squad of skillful employees who worked alternately at the different branch factories.

In the Goodyear Tire & Rubber Co. still another system has been found to yield a uniform output at widely separated plants. In addition to a weekly exchange of products and the most thorough kind of statistics, the company maintains at Akron an interplant relations department that acts as the personal representative of each of the other plants. Men from this department attend all conferences and study the buying and selling problems in which all interests are involved. New ideas, the results of research, standardized materials, test methods and identical specifications have the attention of this department. In short, it is both a clearing house and a directing control. Its success may be gaged by the fact that tires exchanged each week from Akron, Toronto and Los Angeles must be absolutely indistinguishable by appearance and by thorough road tests.

This phase of the problem of uniform production does not concern the management of smaller companies in our industries nor of larger organizations with branch plants that do not make identical products. That the problem can be solved with such precision, however, is evidence of what may be accomplished by the careful, intelligent control of chemical engineering operations.

Textbook Repetition Of Misinformation

BULLDOG tenacity is an excellent trait when the objective is a worthy one; but adherence to an opinion or theory after it has been proved untenable is not scientific. The repetition of misinformation retards progress and is likely to cause misplaced effort; it may result in considerable waste, disappointment and economic instability.

These comments are inspired by the apparent unanimity with which British authors in their analyses of the subject feature a method of extracting nitrate from Chilean caliche that died a natural death not long after its introduction. We refer in particular to two textbooks—"The Nitrogen Industry," by J. R. Partington and L. H. Parker; and "Nitric Acid and Nitrates," by A. Cottrell. In each is given an illogical amount of space to second-hand information on the alleged possibilities of wet grinding, classification and filtration, and in the use and illustration of special equipment the introduction of which for this purpose on the nitrate pampa is no longer recommended even by the manufacturers, to judge by a cessation of intensive sales efforts. The process, moreover, known as the Hobsbawn-Grigioni, or Gibbs, has long since been abandoned by its sponsors. The United States investigators who last year made an exhaustive investigation into the progress of technology in the Chilean nitrate industry acknowledge the information placed at their disposal by Antony Gibbs & Co.; yet it is significant that no mention is made of the Gibbs process in the government report subsequently issued, for the simple reason that it was obviously outside consideration as a solution of the problem.

The Gibbs process attracted much attention, largely because of its complicated character, as compared with the then existing methods, and the resultant opinion that it was revolutionary. Mr. Cottrell in his book mentions that it was based on the "successful metallurgical practice in the winning of gold from ore by the cyanide process," which is undoubtedly correct; but this information merely serves to demonstrate that "A little learning is a dangerous thing." Many methods of applying the cyanide process have been evolved, the progression being necessitated primarily by the change in character of the ore from the surface downward. At first, in many districts throughout the world, the ore was entirely oxidized, friable and pervious to a dissolving solution. It was therefore crushed dry to a comparatively coarse mesh, ½ in. or so, and leached in bulk, with excellent economic and metallurgic results. This material resembled in many respects the typical caliche of the nitrate pampa; and it is interesting to note that *early* cyanide practice was the foundation on which recent successful work in the technology of Chilean nitrate has been based.

As the mining of gold ore was continued to depth, the character of the raw product changed. The rock became harder and impervious. The gold, in minute amount, was usually finely disseminated throughout the mass, often associated with refractory sulphides. Fur-

ther disintegration of the gangue became essential—to expose the gold—to a point at which so much fine material was formed and freed that bulk leaching became impracticable. Wet grinding, classification and filtration, accompanied in some instances by the leaching of a fine sand, followed as logical steps in the extraction process.

Chilean caliche has not changed in physical character, nor is it likely to change. It is extremely pervious to a solvent solution, and the higher extraction of nitrate can be obtained by a logical adaptation of *early* cyanide methods with surface ores—bulk leaching —not by following later cyanide practice with deep-level ores. It is, of course, illogical to expect satisfactory results from an artificial mixture containing a prohibitive amount of slime, such as is found in many partly exhausted caliche deposits that have been robbed of clean material to permit a continuance of output with the Shanks process.

The danger in the repetition of misinformation is difficult to estimate. The favorable publicity given to the Gibbs process led to the development of two other processes along similar lines, and to immense expenditures for research and pilot-mill trials. All such attempts have failed in the economical application of a principle the scope of which was misunderstood or misinterpreted.

As a general principle it may be affirmed that wet grinding, classification, decantation and filtration of an easily disintegrated mass associated with an exceptionally heavy solution, easily crystallizable at lowering temperature, is impracticable of application on a working scale to give results of economic significance. It is possible, with almost any alternative modification, to improve the extraction obtained usually by the Shanks process. Initiative in the introduction of bulk-leaching methods in the technology of Chilean nitrate has been based on openly discussed fundamental principles; and, however galling it must be to British interests to realize that their stewardship of the industry over a long period of years has been barren of technical improvement, that conditions have been maintained at a level of intellectual honesty that merited the sharp criticism administered a short time ago by an eminent British chemist, it is to be hoped that writers of textbooks will at least be impartial in future editions.

Exit the Trash Burner
Enter Chemical Technology

THE first National Conference on Utilization of Forest Products has well been described as a fitting memorial to the work of the late Secretary of Agriculture Henry C. Wallace, one of the great leaders in forest conservation and efficient forest utilization. It undoubtedly can also be equally well characterized as the greatest single step forward in efficient use of this great resource that has ever been taken.

For the technologist the conference was notable because of the great emphasis placed by all interests upon the necessity and the importance of research. But research alone is inadequate. Its application in industrial technology is necessary for practical value to be obtained from it. This, too, was well emphasized by the conference.

At least 10 per cent of the timber cut from our forests each year is needlessly destroyed by preventable decay. At least another 10 per cent goes to the saw mill trash burner or the waste piles of the forest industries instead of to useful application in pulp mills, wood distillation plants, or other byproduct industries that have proved their profit-making possibilities on a full commercial scale. Application of well-known scientific facts and proved commercial methods would eliminate most of this waste; and the leaders of the wood-using industries are beginning to realize not only the importance but also the profit-making possibilities in such development.

The chemical engineer will have a large part in the furthering of this cause. Wood preservation by zinc chloride and by creosote is a chemical engineering problem. Pulp and paper making are chemically controlled industries. Wood distillation, naval stores production and wood pulp utilization in wall board and numerous fiber products, all demand application of those unit processes that the chemical engineer can apply. This service has been undertaken already in connection with the Great Southern Lumber Co., the Northwest Timber Co. and associated firms in Cloquet, Minn., and elsewhere. By spending substantial sums upon research and on chemical engineering development, these companies have demonstrated the industrial possibilities.

It is now clearly the task of the chemical engineer to sell to backward branches of the industry these demonstrated methods so that more nearly complete application may be had. It is unreasonable to expect that industry will assume the entire responsibility. The technologist has his part, and it must not be shirked.

One Way Around
A Growing Difficulty

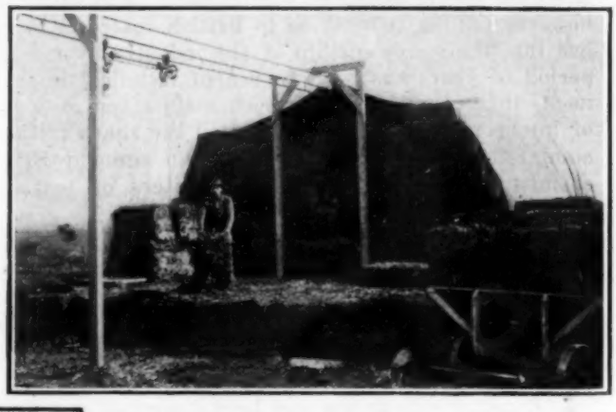
THE equipment used by the chemical engineer grows ever more complex. Not only are all processes formerly performed by hand now done by machine, but for each class of machine there is now available a large choice among designs that differ but slightly. For the engineer to keep the qualities of all these devices sufficiently in mind to enable him always to obtain that one most suited to his needs is rapidly becoming impossible.

Where, then, shall the engineer turn? Engineers' handbooks are in general more concerned with theories of operation than with specific details of machines, so that they are not of much help in this particular difficulty. One possibility was suggested recently by a catalog of mechanical stokers. Instead of being written in the style of the usual catalog—that of sales propaganda for one manufacturer's equipment—this catalog was issued by an association of manufacturers. It described in an entirely impartial way the equipment made by each member of the association and included a series of detachable postcards, one addressed to each manufacturer, so that the reader could send for further information if he so desired.

To our mind this booklet does a real service in gathering together in one place detailed descriptions of all makes of a given kind of equipment. If more manufacturers will follow this lead and associate themselves to the extent of issuing joint, impartial, condensed catalogs, each covering a specific line of equipment, much will be accomplished toward surmounting an ever-growing obstacle in the path of intelligent equipment selection.

The now famous Waconia amber cane, a pedigreed stock that has been bred for 5 years, is shown on the left. It has 20 per cent higher sugar content than the original, a shorter growing time, nearly 30 per cent more seed yield and a greater resistance to head smut.

No One Ever Said,
"There's a Fortune in Sorghum Sirup"
There Wasn't, but It's a Live
Industry Now, at Least in Waconia

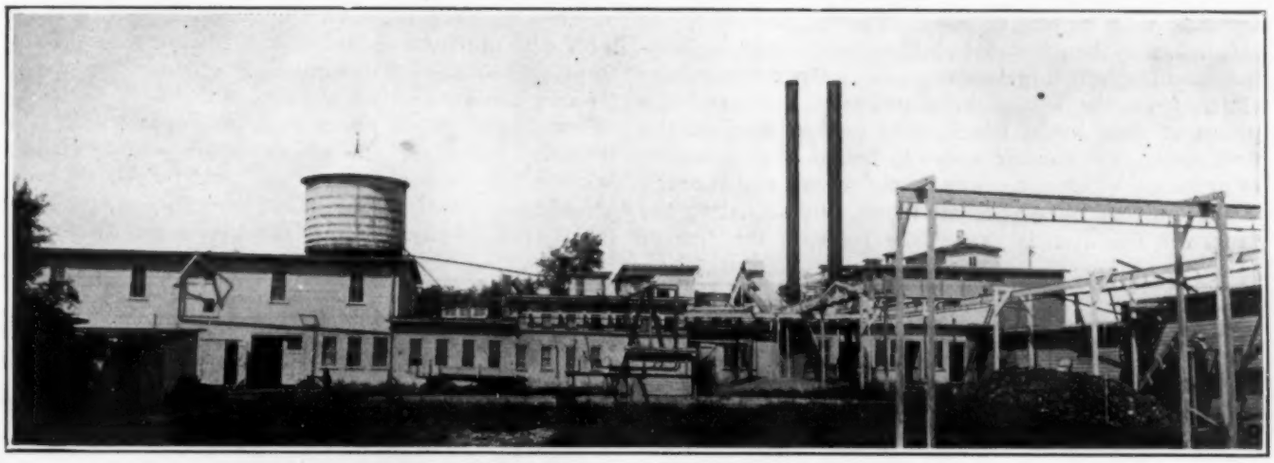


Twenty acres of sorghum cane is shown in upper picture above, and at the left sorghum in the factory yards waiting to be milled.
Above, hay baled and stored, made of dried sorghum leaves.

Chemical Engineering at Its Best

The Development of a Sorghum Sirup Industry

By J. J. Willaman
University of Minnesota



The Waconia Sorghum Sirup Works, Waconia, Minn.

ONE would hardly look to the sorghum sirup industry for conspicuous examples of chemical engineering methods, but in this plant the editors of *Chem. & Met.* have found one of the most conspicuous examples of clever engineering practice that they have ever seen.

This article gives but brief mention of many of the important developments that are forecast for the carbohydrate industries by the co-operation of engineers, chemists and plant physiologists. In fact, one can but glimpse the possibilities of the future in the matter-of-fact brief description by Professor Willaman of the development of the Waconia amber cane. By careful breeding and selection of sorghum varieties this cane has been developed to a point that permits double yield per acre in tons of cane with exceedingly high sugar content and high purity of juice. This result places the sirup mill in such a favorable position as to permit high-quality sirup production at a cost lower than ever before attained in this territory.

But the selection of satisfactory cane is only the first step in the development that has been made at Waconia. A novel and successful system of handling the complete cane, including leaves, has been developed by Edward Wessale, the engineer of the company. This permits the processing of the full cane without stripping off the leaves in a system that uses mechanical handling at every stage. The products are a baled leaf, a dry and cured seed, and a sectioned cane free from trash that contains practically every drop of the initial sugar juice, all with a minimum of labor and at a very low power cost.

Similar advances have been made in the mechanical handling of juice, including diastaste treatment, hydrogen-ion control, clarification, filtration and vacuum evaporation, all by novel and efficient methods. Taken as a whole, this plant should be an inspiration to engineers working in fields not commonly invaded by the chemical technologist. If sorghum sirup making lends itself so well to chemical engineering, surely there is equally attractive field for the chemical engineer in other food-processing industries. And one certainly need not stop with the food industries, nor limit his interest in chemical engineering to the large industrial plants.—THE EDITORS.

THE Waconia Sorghum Mills began many years ago in a small way, and continued to be as small and as insignificant as the thousands of other sorghum sirup outfits scattered throughout the country. The great majority of these mills have long since ceased running for various reasons; but the Waconia Mills has been steadily increasing its output, because it has overcome most of the problems that discouraged early competitors.

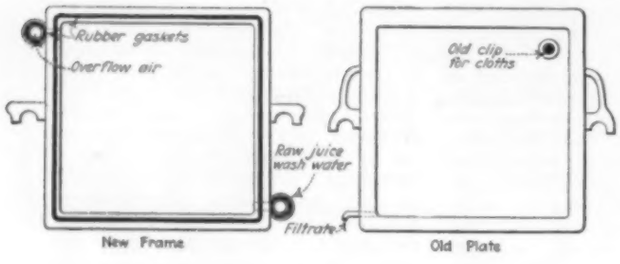
About 10 years ago the two sons of the founder took over the management and decided that they would "make or break" the sorghum game. Within a few years they had decided what were the most critical of the problems involved, and launched a vigorous campaign for the solution of these problems. Probably the most important was the removal of the leaves and seed from the stalks. This had always been done by hand in the fields, and imposed a heavy labor handicap. They have now developed a machine to do this efficiently; and it is this machine that has made the present sorghum sirup industry possible.

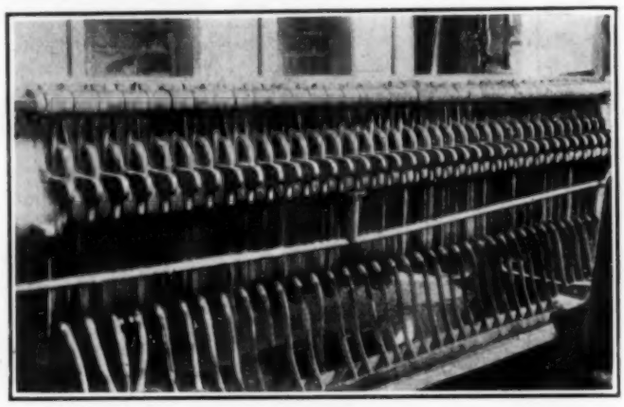
The three most important and novel features in the present plant are the separator for cleaning the cane, the process of defecation and filtration, and the utilization of byproducts.

The whole sorghum plant is harvested in the fields by

means of a corn binder. The bundles are left on the ground for a few days until the leaves are dry, and they are then brought to the factory. Here they may be fed into the separator directly or they may be shocked in the yard. The first operation of the separator is to cut off the seed heads, together with most of the top joint of the cane. These seed heads are conveyed to a kiln, where they are carefully dried, as will be described later. The stalks with the leaves attached then pass with an intermittent motion under a knife, thus cutting up both the leaves and the stalks into pieces about 4 in. long. A drawing motion of the knife makes a clean cut through the cane with no loss of juice. The mixture of stalks and leaves is then elevated and passed through a cleaning machine, which makes a clean-cut separation of the stalks from the leaves, finer pieces of cane and the pieces of seed heads which were not removed in the first place. The cleaner works by means of several sets of gratings, which are continuously shaken and through which a strong current of air blows. By adjusting the fans, the operator is enabled to regulate the size of stalks that are retained, and can thus include or exclude the finer pieces, which usually contain juice of inferior quality. The leaves are conveyed to another kiln, as will also be described later. The clean sections of cane drop into a hopper, at the bottom of which is a scroll conveyor for feeding the crushing mills. The separator in use at Waconia at present is designed to handle about 150 tons of sorghum cane per 24 hours. There is no apparent reason, however, why it could not be made for any capacity and even be used on sugar cane, if it were found feasible to harvest the latter with the leaves on.

The diagram below shows how a recessed plate type of filter press was converted into a plate and frame type. The center feed through the clips of the plate was plugged, and the cloths are now simply held between the shoulders of the plates and frames. A feature is the rubber gaskets on the shoulders and on the channel lugs of the frames. These make for tightness and for greatly reduced wear on the cloths. The photograph (right) shows a side view of the press.





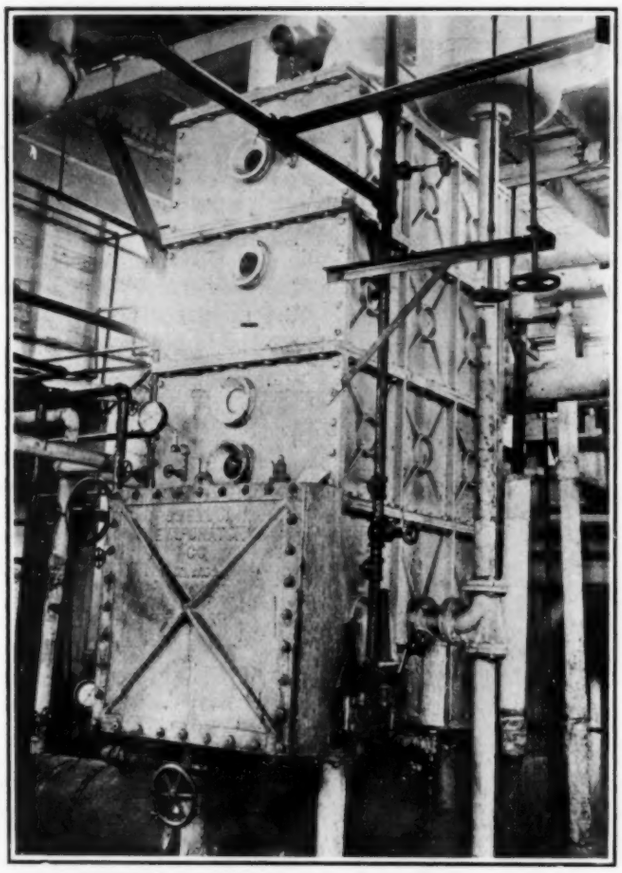
Did You Ever Try Clarifying With an Enzyme?

In all of the smaller sorghum sirup outfits and in most of the larger ones, clarification of the juice is obtained by simply boiling the juice and removing the scum, or in some instances by allowing the heated juice to stand, and the sediment thus to settle out. Sometimes lime is added for partial neutralization of the acidity.

In the factory under discussion careful attention is given to the control of the acidity. If the latter is too high, the resultant sirup will have too sharp a taste. If the acidity is reduced too low, the sirup will be too flat in taste and will be considerably darker in color. The happy medium is the point decided upon by each manufacturer according to his own judgment. Hydrated lime is the material used; this is added to the juice as soon as the clarifying tanks are filled. The juice is then heated to boiling to coagulate the protein substances and to gelatinize the starch. It is then cooled to about 60 deg. C. on its way to the diastase tank.

The use of malt diastase is a recent development, and was suggested by the work of Sherwood. When the attempt was first made to filter sorghum juice, considerable difficulty was encountered. The juice, even after heating, appeared to be unusually gummy. By the use of very large quantities of kieselguhr, the juice could be filtered, but at considerable expense. Even at that, however, a waste of juice in the scums was avoided and a clear juice was obtained that could be readily evaporated in a vacuum pan. This procedure was followed until 1923, when Sherwood announced that the gummy nature of sorghum juice was largely due to the contained starch, and that this could be removed by the use of malt. This process was found to work very satisfactorily, and much clearer filtrates are now obtained, with the use of very much less kieselguhr and with less labor at the filter presses. In case abnormal juice is at hand, activated carbons are sometimes used in order to correct color and flavor. During the great majority of the time, however, their use is not necessary. When it is necessary, double filtration is resorted to so that the carbon need not be contaminated by the sludge of the unfiltered juice.

Another item that sometimes enters into the control of the juice is the sucrose content. If the latter is rather high, as it often is in the earlier part of the season, the resultant sirup is likely to "sugar out," since the sirup has a density of 79 deg. Brix. When the analysis of the juice shows that sucrose constitutes 60 per cent or more of the total sugars present, invertase is added along with the diastase. This has been possible only within recent years, since commercial production of invertase.



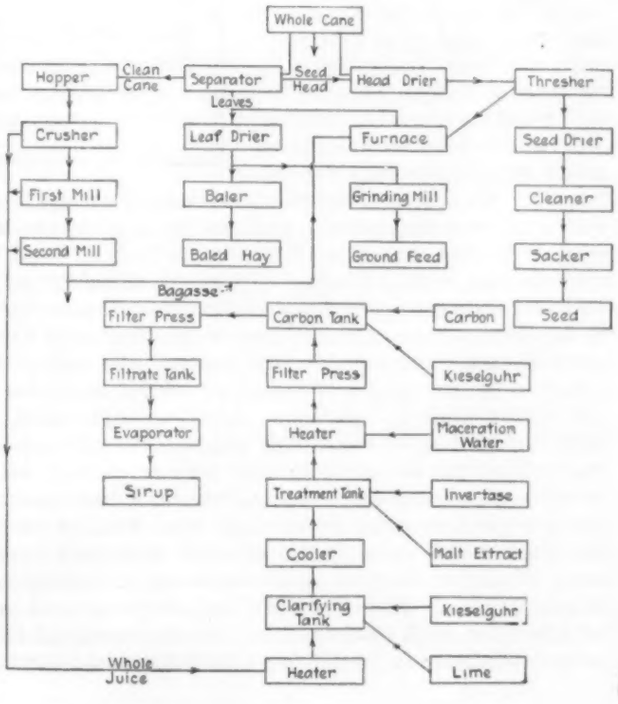
The interesting thing about this evaporator is the extra section in the body. It increases the height of the unit and allows for extra foaming of the juice. Under the evaporator can be seen a receiving tank, which permits the emptying of the unit without breaking the vacuum.

Byproducts Often Establish Financial Success

Just as so many other industries have really obtained success through the efficient utilization of byproducts, so it has been with the Waconia Sorghum Mills. In the first place, the bagasse furnishes about three-fourths of the fuel. The leaves were formerly burned, but are now shunted to a special kiln, where they are dried to 10 per cent of moisture and either baled for hay or ground for feed mixing. By far the most important byproduct is the seed. Formerly salvaging of seed was accomplished by spreading it on the ground and taking a chance on the weather being favorable for partly drying it. When the season was over, it was hung up in sheds. At the present time, however, the seed is dried in a kiln with temperature and humidity carefully controlled so as to preserve the vitality of the seed. When the seed heads leave the kiln, they are dry enough for threshing. After threshing, they are placed in a grain drier and the finishing touches are put on the drying process. In this way all of the seed that is brought to the factory is utilized and the Waconia company is now supplying a very large part of the Northern grown amber sorghum seed. Of late years there has been a very considerable increase in the amount of sorghum grown for forage purposes, and this necessitates a careful conservation of all available seed.

About 5 years ago it was decided that some improvement was possible in the Minnesota Amber sorghum that had been grown at Waconia for a great many years. Therefore some selection work was started with the object of improving the strain along four principal lines—sugar content of the juice, tonnage, earliness, and resistance to head smut. After 5 years of work, there has now been selected a strain called the Waconia amber that is considerably superior in all of these respects to the original Minnesota amber. Chemical analyses were made of about 1,700 individual stalks and mass analyses of about sixty plots. The total sugar content of the mature juice is about 16.2 per cent and the Brix reading about 19 per cent. This is an average of about 20 per cent over the original. The growing period has been shortened several days, so that it is now about 90 days on the average. The yield of seed is from 22 to 30 bushels per acre, which is rather high for a saccharine sorghum. One of the most important points is that the new strain is resistant to head smut, which causes very considerable loss in both tonnage and seed yield in regions where sorghum has been grown to a considerable extent for some time.

This is a ring-around-rosy flow sheet, but it is easy to follow if you note the line at the left, which shows the path of whole juice. The diagram brings out strikingly the splendid utilization of all material byproducts.



What About the Future of the Cracking Process?

Probable Developments May Result in a Revival of Vapor-Phase and Lower Pressure Equipment, With Perhaps an Increased Interest in Catalytic and Chemical Processes

By R. H. Brownlee
Consulting Petroleum Technologist, Pittsburgh, Pa.

TIME and chance ever play an important part in the development of technology as well as of the human race itself. A great mind of one generation evolves a process that, being ill timed, produces nothing, but the same idea later revived wins fame and fortune for the one who may independently hit upon the same thing or else through his painstaking research may brush away the dust of the passing generations and discover the teachings found thereunder.

Such is the history of the cracking of petroleum; doubtless invented before a propitious time, when the need came there were those with the ability and backing to take up the problem and advance it far beyond the dreams of the original experimenters. The manner in which it was first developed commercially and the type of equipment used are also due largely to this same element of chance. Being developed by an organization accustomed to using tank stills for all distilling operations under atmospheric pressures and return tubular boilers for producing steam, what was more natural than that a still be designed heavy enough to withstand the higher pressure and equipped with means for regulation of it? On the other hand, had this same company been accustomed to the use of tube topping stills, my guess is that the Burton still would have been built of tubes with shells only for receivers. As a matter of fact, the later Burton-Clark still is of tube construction and the tendency is almost entirely in that direction.

If the first carbon troubles with the shell-type Burton still had not been promptly solved by the efficient work of Dr. Humphreys, the shell type would doubtless have been discarded before the first battery was built. It seems to be the opinion of many conversant with conditions that probably no more shell-type stills will be built by the larger companies, although on account of their simplicity of operation they may be utilized with advantage by smaller organizations. Within recent years some companies have constructed slightly modified Burton shell-type stills and under their own name carry them on their balance sheets as inventions of immense value. That is surely the safer way to make an invention; pick on something already developed and all but duplicate it, modifying only some non-essential.

Has the cracking process reached the peak of its commercial development in supplying today's tremendous demands for motor fuel, or will it continue to play a part in shaping the future of the petroleum industry? Dr. Brownlee holds that we are only beginning to appreciate the real influence of this development. The oil refinery of the future will be built around the cracking plant that will give it the required flexibility and capacity. But what does the future hold for the process itself? This article points to a number of chemical engineering developments that may greatly increase the efficiency of cracking equipment.

Now that the tendency is almost wholly toward tube stills and furthermore to decrease the sizes of tubes in these, may we not also soon see a revival of vapor-phase cracking? It is the opinion of several petroleum technologists of my acquaintance that the time is near when vapor-phase systems will be revived and operated profitably. As a matter of fact, a number of installations are operating at the present time. One condition is especially favorable toward such a revival—namely, the fact that unsaturated hydrocarbons are not now looked upon as something to be shunned and removed before using the gasoline. More people are learning that unsaturated hydrocarbons are actually a benefit to the smooth operation and power of the motor.

The old bugaboo of resins plugging the gas lines in our cars and doing other disreputable things is largely dispelled. When this does happen, the trouble is easily remedied. With various condiments of one sort and another for putting pep in our motors, we are getting over our insistent demand for water-white gasoline along with the nonsense about jet black tires for the cars.

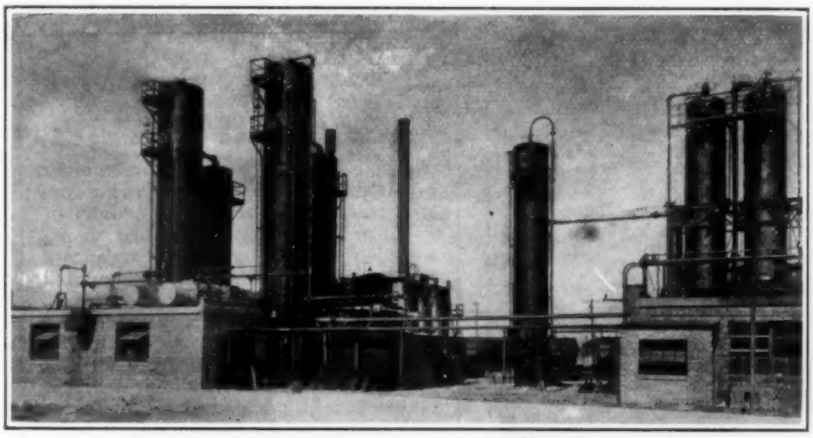
I believe it will come to be recognized that excessive pressures are entirely unnecessary even for cracking kerosene distillates and if no other existing equipment can be satisfactorily utilized a properly designed and operated vapor-phase process will eliminate any necessity for resorting to high pressure. Experience has shown that there is certainly no justification for its use for heavier distillates or residues. A vapor-phase equipment should be less expensive for the same throughput than an excessively high-pressure equipment and besides will be safer to operate. Probably a vapor-phase process comprising a combination, something on the order of a tube-and-tank equipment, may be a development of the near future. The idea of an efficient catalytic method of cracking is also something with which to conjure. It would certainly be a bit risky to say it is an impossibility that someone may find a catalyst for cracking heavy oils so efficiently that our present methods will appear as crude as an oxcart beside a Ford coupé.

Advantage will also be taken of the fact that similar to many, if not most, chemical reactions, the cracking process is reversible to an extent at least. In any crack-

ing process a certain amount of unsaturated hydrocarbons is produced. Low-temperature processes such as the Fleming and the Burton produce the least unsaturated hydrocarbons, while the vapor-phase process produces a much greater percentage. It has been established that by a catalytic method these unsaturated hydrocarbons can easily be polymerized to form high viscosity lubricants of very low-cold test. A valuable characteristic of such a lubricant is its stability in an internal combustion motor and hence the absence of a tendency to carbonize the cylinders. The value of such an oil, especially for airplanes, has already been demonstrated and would seem to require little argument relative to its use in automobiles. However, this idea is advanced in spite of statements by eminent authorities on lubrication, who assure us that with all their experience with motor lubricants one lubricating oil is just as good as another, if not better.

In the writer's opinion, the oil refinery of the future will be built around the cracking plant which will have a capacity ample to handle all the crude and the present crude still will be largely obsolete.

Ultimately almost all crudes will look alike to the refiner and by processes of cracking and polymerization and other chemical means he can make whatever product he requires. Certain fractions of high-grade crude doubtless will be extracted as such as long as such material can be found, but with newer processes and improvements that can be developed when required, the refiner of the coming decade will face the future of type of crude available without fear or favor.



A Cross Process Cracking Plant

This view is taken from the control house side of an installation in a Texas refinery. The units at the left are of the most recent, 1,000-bbl. type provided with bubble tower equipment. The older units at the right are of 660-bbl. capacity and bubble towers have been added to them since they were first installed.

Modern Cracking Processes

In a preceding article of this series (see *Chem. & Met.*, Nov. 24, 1924, pp. 812-17) the writer discussed several cracking processes that are largely used in the industry. These included the Burton and its modifications, the Cross, the Dubbs and the Fleming processes. While it is frankly impossible to treat all of the various systems in comparable detail, it will perhaps be worth while to discuss briefly a number of other processes that have attracted the attention of the industry.

Isom and Holmes-Manley Systems

The Isom equipment used by the Sinclair Refining Co. is the invention of Edward W. Isom. Gas oil or other similar distillate is heated under pressure in a still of special design having vertical tubes. The products are condensed under pressure. The oil is circulated as the result of heating and also by a propeller placed in the supply pipe outside the furnace. The vertical heating tubes are connected by manifolds. The hot oil leaving the tubes circulates to the still or reaction chamber that is partly filled with the hot liquid. The liquid hydrocarbons volatilize here and pass through a dephlegmator to the condenser. Little carbon is said to be deposited on the heating tubes, on account of the rapid circulation of the oil and also because the tubes are vertical. The outer and lower branches of the manifolds are closed by movable plugs for convenience in cleaning. The equipment is operated continuously over a considerable period of time.

The Holmes-Manley cracking equipment is controlled by the Texas Co., which also controls the Hall process and the Gray aluminum chloride method and equipment devised by J. H. Adams.

The Holmes-Manley process has been in operation at Port Arthur, Tex., since December, 1920. The equipment is operated in batteries of four stills each 3 ft. in diameter and 40 ft. high and provided with a scraper arrangement for removing carbon from the sides. The operating pressure is about 175 lb. in the first equipment. Later equipment designed for 500 lb. working pressure has been installed. Of the total oil charged 27 per cent is said to be converted into gasoline passing the new navy specifications.

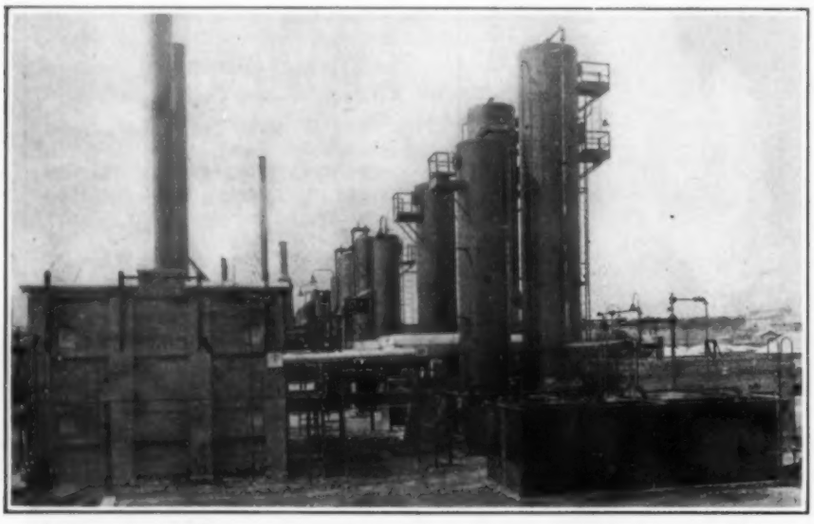
Tube-and-Tank Equipment

Among the more recent processes to attract attention is the tube-and-tank equipment of the Standard Oil Co. of New Jersey, which was invented by Carleton Ellis. In this, the oil is heated to from 750 to 900 deg. F. by passage through one hundred and thirty 4-in. tubes set in a furnace. The oil is discharged into a pressure still 6 ft. in diameter and 40 ft. long, which is set in the furnace above the tubes. The walls of this vessel are approximately 2 in. thick. A pressure of 250 to 350 lb. per sq.in. is held on the pressure still or the reaction chamber. The pressure relief valve is located at the end of the reaction chamber opposite that which the heated oil enters. A number of units are in operation in plants in the United States and foreign countries. It is claimed that the tube-and-tank process will handle all common types of distillate, heavy crudes and residual fuels. A particular merit of the equipment is the claim to give the maximum of safety for a commercial high-pressure cracking operation.

Among the rather widely advertised cracking methods of a number of years ago were those of Hall, Rittman and Greenstreet.

The Hall equipment was invented by William A. Hall and about 10 years ago was experimented upon quite extensively both in the United States and in England, chiefly for the purpose of making benzol and toluol. A number of installations, however, were made for the production of gasoline. In this equipment the oil is first vaporized in a 1-in. tube and preheated in a flue by the waste heat of the products of combustion in the furnace so that it enters the cracking tubes at a considerable temperature and at a high rate of speed. The vapors issuing from the heating coil pass into a vertical pipe 12 in. or more in diameter and about 12 ft. high and impinge against a baffle in the large pipe so that the speed of flow is incidentally reduced from about 6,000 ft. per minute to a very nominal rate. This converts the energy of speed into that of heat and the temperature actually increases about 30 deg. C. notwithstanding the reduction of pressure from 70 lb. to about atmospheric.

This equipment has been operated from a slight vacuum up to about 1,500 lb., but 75 lb. is said to be most practicable. In this country, the Texas Co. took over the equipment and started a 500-bbl. plant in November, 1916. For gas oil or low-grade kerosene, a yield of about 40 per cent of gasoline is obtained in one passage through the apparatus, but large gas production results. The coils in this plant consist of 640 ft. of 1-in. cold-drawn steel tubing. The operation of the equipment apparently did not prove profitable.



Cracking Oil in a Gun Forging

The furnace side of one of a number of Cross process units, showing arrangement of principal equipment such as fractionating towers, horizontal reaction chambers, condensers and controls. The heavily insulated reaction chamber is a gun forging, 42 ft. in length, with an outside diameter of 46 in. and walls 4 in. in thickness. The total weight of the forging is 80,000 lb. Its working pressure is 600 to 700 lb. per sq.in. and its factor of safety is 10 to 1.

The Rittman cracking equipment for a time received more public attention than any cracking process so far developed. Dr. Walter F. Rittman developed his method and equipment on a small scale while at Columbia University and with the Bureau of Mines. It was considered a good possibility, especially since toluol as well as gasoline could be produced, and this was at the time when toluol was sorely needed in the early years of the war. Accordingly the inventions of Dr. Rittman were heralded countrywide and on account of the exigencies of the time those in charge of the process were rushed into arrangements and contracts to erect the plants before it was possible for anyone to determine the best methods of procedure and the best type of equipment. The first supposedly commercial outfit was erected in Pittsburgh for the Aetna Chemical Co. and was operated for a number of months before it was moved to one of the suburban towns. While without a doubt the Aetna Chemical Co., which contracted to spend a large sum of money to develop this equipment, did not recover its money directly, it is fairly well authenticated that having the Rittman process operating served as a club by which it was able to renew valuable contracts for toluol and hence it probably was in no way the loser by the venture.

After this a number of units were erected in various parts of the country for the production of gasoline and the writer is informed that one of these units is still operating satisfactorily in western Pennsylvania. On account of the desire for toluol, the Rittman system was called upon to stand exceptionally hard service from the start and before anyone was in a position to develop the equipment to the necessary commercial stage. The Rittman plant consisted of vertical tube 12 to 16 in. in diameter, 12 to 15 ft. long with walls 1 in. thick. Fittings were made of heavy cast steel. The first tubes used in the Pittsburgh plant were 8 in. in diameter and had about 1-in. walls. It was found that, of course, when oil was sprayed into one of these tubes when heated to a high temperature, carbon deposited on the walls. Accordingly there was added a cast-iron paddle to which were fastened chains to remove the carbon. Unfortunately, on account of the radiant heat in the tube, the stirrer became a good accumulator for carbon and did not do the necessary cleaning. Later when operating upon gas oil or kerosene for the purpose of making gasoline, it was found that the equipment could be arranged to work satisfactorily and give a yield of around 28 per cent of gasoline and a loss of about 5 per cent in the form of gas and carbon.

Greenstreet and Forward Systems

The Greenstreet process was invented by Dr. Charles J. Greenstreet, who began working upon the cracking of oils in the earlier days of the development of cracking. While Dr. Greenstreet operated in the vapor phase, he did so in the presence of a considerable amount of steam. His cracking coil, of which usually about eight are placed in a single furnace, consisted of twenty 20-ft. lengths of 2-in. drawn steel tubes arranged in a continuous coil. Originally, these coils were welded together, but later he used cast-steel return bends welded on and held in place by cast-iron supports. This equipment was largely operated to make synthetic crude, which after cooling was picked up

from the storage tank and re-run in the steam still to make the required end point gasoline. The operating pressures were from 75 lb. to 150 lb. and the steam varied from one-eighth to one-fifth of the weight of the oil treated.

The gasoline yield varies with the raw materials, but in a single passage through the coils 25 to 40 per cent of the heavy oil could be converted into gasoline of 437 deg. F. end point. Carbon troubles are not a serious factor in the operation of this equipment. On account of the high velocity of the oil vapor and the protection afforded by the presence of steam, very little carbon is deposited in the tubes. At the end of the week's run some of the tubes would show thin films of carbon scarcely one-sixteenth of an inch thick and ordinarily this was removed by blowing down with air. A number of these plants were built some years ago, but at the present time the writer has not been able to learn of one in operation.

Mention might also be made of the Forward equipment, designed by Dr. C. B. Forward of Urbana, Ohio, who is reported to have several units in operation. The essential and most interesting feature of Dr. Forward's equipment is based upon the idea of maintaining an extremely uniform temperature. This is done largely by first superheating steam and then heating the oil by means of the superheated steam. Theoretically, the idea is undoubtedly good, but the question of expense arises as to whether or not it is necessary to go to this extreme. Such excellent results and freedom from serious carbon troubles have been secured in equipment where direct heating is utilized that there seems to be some doubt as to the necessity for the extreme care.

There are literally hundreds of other equipments which it is not possible even to mention in a brief article such as this. The aim has been, first, briefly to describe the equipment actually operating on a large scale, and second, to indicate the different types of processes rather than to attempt the impossible task of securing reliable data on all equipment and methods that have been tried.

As indicated previously, while endless names are applied, it is general knowledge that the many processes are largely slight variations on systems already discussed. Reference may be made, however, to details of many forms of the existing equipments in such authoritative treatises as "Gasoline and Other Motor Fuels," by Carleton Ellis and Joseph V. Meigs, and "Motor Fuels," by Dr. E. H. Leslie.

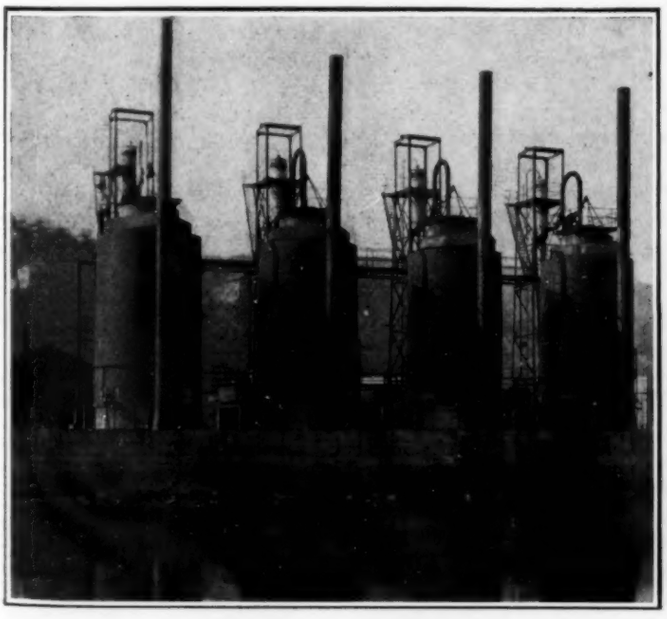
Chemical Cracking Processes

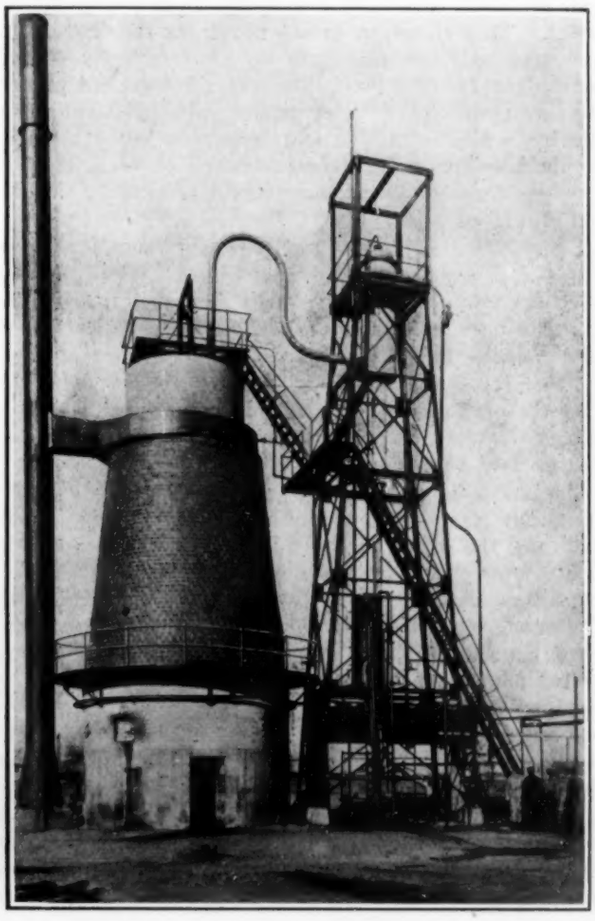
A large number of chemicals such as ferric oxide, metallic iron, ferric chloride, bauxite, kaolin, aluminum chloride and lime, as well as various metallic baths, have been tried as catalysts to assist in the production of gasoline. So far as is known, all of these materials have gone into the discard with the exception of iron ore used in the Ramage process and aluminum chloride that has been developed of late years by George W. Gray and A. M. McAfee. The latter is being utilized by the Gulf Refining Co. to make a considerable amount of gasoline. The product is of excellent quality, but it appears that this method of operation is more expensive even than the operation by pressure stills for the manufacture of gasoline.

The method of operation is simple and safe, owing

A Single and a Four Unit Plant of the Fleming Process

The essential difference in these two installations is in the construction of the furnace and still setting. The larger and more recent installation uses steel plate instead of the all-brick construction. Each of these units has a rated capacity of handling 200 bbl. of gas oil or charging stock to yield 70 bbl. per day of gasoline of new navy specifications.





to the fact that no pressure is required and, as previously indicated, the gasoline is entirely satisfactory and quite similar to straight-run gasoline. The main drawback, however, is that the aluminum chloride costs too much to manufacture to be thrown away after each operation and as yet no satisfactory method for thoroughly reviving it has been developed. The other difficulties met with in the operation could be overcome provided the problem of the expense of the aluminum chloride could be satisfactorily solved. There is a great deal of talk relative to the principal merits of certain cracking equipments, and in making comparison of the claims one is struck by the great difference in the yield of gasoline claimed for different methods of operation.

Comparing Yields and Processes

A year or more ago a consultant was asked how he could recommend a certain process to a company when its backers claimed to produce only around 35 per cent of gasoline, while another equipment which he himself was considering installing would produce 60 to 65 per cent. It was found upon making direct comparison that the first promoter was talking about the percentage of gasoline for throughput and the other was assuming that the residual oil, whether gas oil or fuel oil, was credited to the amount charged. Thus the yield of 65 per cent which he got represented the relationship between the amount of gasoline obtained and the amount of charging stock used. When figuring in this same way, the first method was shown to indicate a corresponding yield of 68 or 69 per cent. When referring to yields of gasoline from any particular equipment it should always be determined just how those yields are figured. It should also be kept in mind that all cracking processes are not equally suitable for every refinery. The conditions should be carefully scrutinized before deciding which is the better equipment for any given plant.

The author wishes to acknowledge his indebtedness collectively to those individuals and companies supplying him with information and data regarding certain of the processes, and also especially to thank the M. W. Kellogg Co. for the use of many of the photographs that have illustrated these articles.

Fluorine Awaits Uses

Most Active of All Chemical Elements Can Now Be Prepared Without Difficulty

By F. C. Mathers
Indiana University, Bloomington, Ind.

ALTHOUGH the most active of all chemical elements, fluorine is unknown in the field of commercial chemicals and is a rare curiosity even in university laboratories. This situation arises not from the scarcity of raw materials but from the extreme difficulty of preparing the free fluorine. Recently, however, a process has been developed that makes the preparation of fluorine a simple matter and being now available, uses should develop for it. The process is covered by U. S. Patents 1,484,733 to Mathers and 1,484,734 to Mathers and Huniston.

Briefly, molten potassium hydrogen fluoride is electrolyzed in a cylindrical graphite cell, 9 in. high with ¾-in. walls, that serves as containing vessel and cathode. Chromel wire is wound around the outside of the cylinder but insulated from it so that the bath may be kept at the proper temperature; KHF melts at about 220 deg. C., or 428 deg. F. A heat-insulating jacket of alberene stone and an outside copper jacket complete this part of the cell.

The anode is graphite and the anode lead is a copper tube that also serves as outlet for the fluorine. Surrounding the anode is a graphite bell diaphragm 2 in. in diameter with ½-in. walls supported so that the lower edge dips about 1 in. below the surface of the bath. The anode lead passes through the top of this bell and is of course insulated from it, ground fluorspar and melted potassium hydrogen fluoride being used to form the insulating joint.

A current of 10 amp. per sq.dm. (93 amp. per sq.ft.) is required at 12 to 15 v. The current yield is about 70 per cent of very pure fluorine, containing 0.17 to 0.2 per cent carbon fluorides. Hydrofluoric acid is removed from the gas by passing over anhydrous sodium fluoride in a copper tube. Copper tubing is satisfactory for handling fluorine. Connections can be made with brass fittings not requiring gaskets of organic material, such as are used on gasoline lines in automobiles. Tight joints are best brazed with silver solder. Indeed, the entire cell, except the anode, may be made of copper.

There are two possible chances of failure for inexperienced operators. No fluorine is evolved until the molten bath is entirely free from water. Often the bath, when newly prepared, must be maintained in a molten condition and must be electrolyzed with a low current for 8 hours before fluorine is evolved. This unexpectedly long period of time needed for dehydration is probably the reason why others have failed to discover this process. Too high a temperature of the bath prevents the evolution of fluorine.

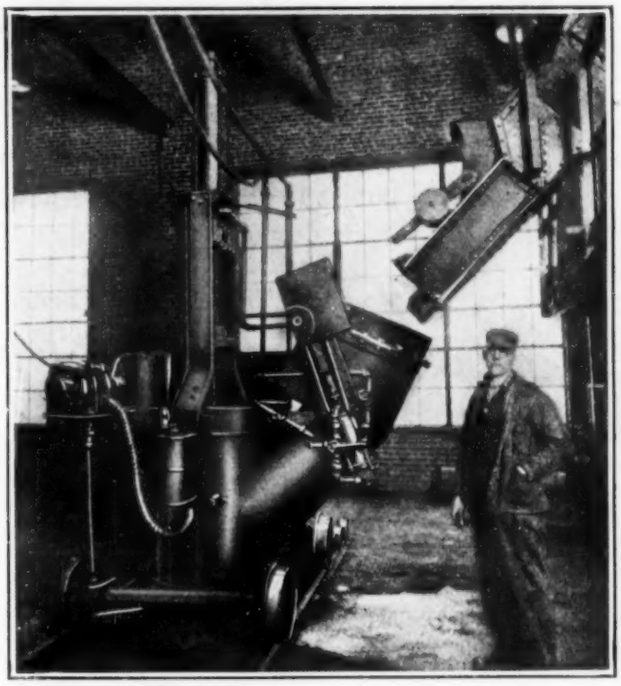
No materials are known that can be added to the bath to reduce its melting point. The presence of other fluorides increases the loss of hydrofluoric acid. During electrolysis the melting point of the bath and finally the whole electrolyte must be regenerated by crystallization from an aqueous solution of hydrofluoric acid.

The odor of fluorine is a satisfactory qualitative test. It resembles a mixture of ozone and chlorine, but without the irritation of the latter. A test for leaks in the apparatus may be made by bringing an unlighted gas stream to the suspected place. Free fluorine ignites the gas instantly.

Lime for Carbon Dioxide Absorption

For carbon dioxide absorption, lime is frequently used and the Bureau of Standards in Circular 189 recommends that quicklime for this purpose should contain not less than 90.0 per cent of available lime; hydrated lime not less than 85 per cent of available lime, computed on the basis of non-volatile matter. Hydrated lime should be of such fineness that 99.5 per cent will pass a No. 50 sieve, 97.0 per cent a No. 200 sieve. For use, hydrated lime may be moistened and spread out in thin layers over which the gas to be purified is passed, or the gas may be scrubbed with a milk of lime made from either quicklime or hydrated lime.

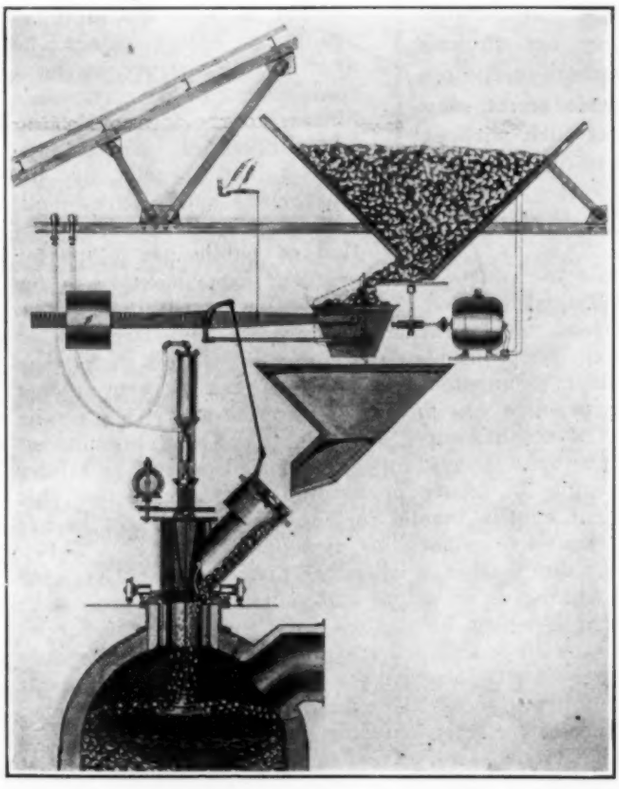
The most obvious difference in this machine is its compactness. Without inquiring further into the mechanical features, this is a distinct advantage. The photograph shows in perspective what is more easily seen in the diagrammatic sketch at the bottom of the page.



Saving Money *in the* Form of Calories

F. W. Sperr, Chief Chemist of The Koppers Company, Explains the Advantages of the Automatic Charging of Water-Gas Generators

AUTOMATIC charging has lately been introduced and will doubtless soon become a regular feature of the modern water-gas plant. The illustrations show the automatic charger installed by the Western Gas Construction Co. at Kokomo, Ind. Charging is accomplished without opening the top lid. The fuel is effectively banked against the outer wall of the generator, causing the fines and large lumps both to be thrown to the outer wall. The fines settle down along the outer wall and the large coke rolls to the center. The top of the fire is thus maintained in the form of a hollow inverted cone, which is ideal for water-gas operation. The result has been practically uniform condition of fuel bed over the entire cross-section of the generator and an increase in capacity of about 15 per cent, of which 6 to 8 per cent is due to the time ordinarily lost in the charging machine and the remainder to the more effective gas-making condition of the fire. The device has been found to have particular advantage in using soft coal. In this case the ordinary tendency to form blowholes is practically eliminated by the automatic charging, in which a small amount of fresh fuel is introduced in each run.



Coal is fed from the storage hopper onto the rotating disk, which in turn delivers to the weighing hopper. When this is full it is automatically dumped into the feed chute and the charging door is opened by the same movement. The fuel is then fed onto the fire bed by means of the whirling disk, lowered from the charger into the generator at the start of the operation.

Modern Industry's Mid-Victorian Companion
The Trade Secret

The Methods of Protecting Trade Secrets Are Well Known, but It Is Not Common Knowledge That the Effects of These Methods Are Frequently Unfavorable to the Possessor

By Bruce K. Brown
Patent Department, Commercial Solvents Corporation, Terre Haute, Ind.

IN 1924, more than 10,000 pages of chemical information were published in the technical magazines that record the progress of chemistry in the United States. During the same period hundreds of books and pamphlets were printed to disseminate chemical data throughout the country, and more than 2,000 patents pertaining to chemistry in its various ramifications were issued by the United States Patent Office. While chemical data were thus broadcast in the United States, the societies, publications, government bureaus and patent offices of our sister countries were similarly engaged in making public various chemical theories, processes and formulas.

When one realizes that this veritable deluge of chemical information has been going on for years and is increasing annually in volume, it seems that the day of secrecy in science and industry is indeed abolished and that chemical discoveries are given to the world as fast as they are made. True it is that the industrially desirable chemical processes and products are ordinarily reserved temporarily to the sole use of the inventor by the exercise of the right of patent monopoly. But the existence of patent statutes encourages the complete publication of chemical processes, and these statutes are, in fact, the greatest single influence in industry in the gradual elimination of the policy of "trade secrecy."

In the presence of the ever-increasing flow of chemical information it would appear that the old-fashioned trade secret is an anomaly that will soon pass into the limbo whence alchemy and phlogiston have vanished. In fact, the chemical trade secret appears to be the last stronghold of empiricism—where the doctrine of "a little bit of this and a little bit of that" still holds forth.

But it is not the purpose of this writing to debate the virtue of the trade secret *per se*. The rigid restrictions against visitors that are in force in most chemical plants, together with the yearly grist of "trade secret cases" in the courts, are fair indications that the chemical trade secret is not yet obsolete. Furthermore, the fact that the employment contracts, which most chemists must sign on entering a technical organization, ordinarily contain a "secrecy clause" certainly indicates that the policy of secrecy in industrial chemical operations still has many adherents. Since the policy of maintaining chemical processes and formulas as trade secrets is evidently still an attractive one to some manufacturers, attention should be directed to the results sometimes accruing from such a policy.

> There is no doubt that many tenderly regarded secret formulas and processes are not in fact trade secrets at all. A trade secret as viewed by the courts must have certain attributes, foremost of which is that the supposedly confidential information must be in fact a true secret and known to no one but the manufacturer and his confidential employees (4), (10). While a real advantage may be maintained over competitors by preventing any spread of knowledge concerning various "tricks of the trade" as employed in the factory, such devices are not legally enforceable as trade secrets if they are obvious expedients to skilled workers in the art (5). Nevertheless a trade secret may be legally enforceable as such without being a proper subject for letters patent (6).

From the viewpoint of the chemical manufacturer the questions of trade secrets and patents are hopelessly interwoven. For example, secrecy in laboratory research is elemental for many reasons. When the process has left the laboratory stage the invention is presumably complete and the manufacturer must choose one of three courses: He may attempt to cover his improvements by letters patent, he may operate the process as a trade secret, or he may resign himself to the idea of letting his competitors learn of the process and benefit by his enterprise and investment.

Here arises the nice question of public use (1),* for while the courts are tolerant of experimental use for an extended period if the invention is still under development, the operation of a process on a large, or on small but profitable, scale for more than 2 years may render it unpatentable unless it can be proved that the practice was an entirely secret one. Then again, if the manufacturer succeeds in keeping his process a profound secret for an extended period and later attempts to secure or enforce patent protection, his patent may be invalid for the very reason that he has attempted to prolong his monopoly (2), (3).

Assuming that a chemical manufacturer has what he believes is an actual and valuable secret process or formula which he desires to maintain as such, can he take steps and provide protection that will actually insure him the exclusive right to secretly practice his formula or process? To answer this question we must, of necessity, refer to some extent to legal reports in which trade secrets are mentioned. In this we must

*Figures in parentheses refer to authorities listed at end of article.

remember that trade secrets are ordinarily involved at law only when the attempt to maintain secrecy has failed and legal redress has been sought. For this reason most of the information is derived from unsuccessful or temporarily unsuccessful attempts at secret operation. Certain methods are commonly employed by chemical manufacturers by which they intend to prevent the outside world from learning of the details of their manufacturing operations. Among the most important may be detailed the following: (1) Contracts with employees; (2) physical obstructions against entrance to the plant; (3) the pass system or "guest book"; (4) warning signs; (5) inaccessible location of apparatus; (6) camouflage; (7) concentration of information; (8) division of information.

Strangely enough, some of the devices most effective and most practical to prevent the actual dissemination of information have been regarded by the courts as positive evidence of non-secrecy when submitted as evidence of the validity of the secret. These facts and others are worthy of the attention of executives who attempt to maintain chemical trade secrets and of chemists and engineers who are possessed of information of this type.

A Secrecy Contract for Technical Men?

While a contract to maintain as a secret, confidential information acquired while in the employ of another may best be placed in writing as a definite obligation, such a contract need not be written to be effective. The acceptance of employment in a confidential relation implies a contract not to disclose trade secrets, and the courts will enforce such an implied contract provided it is proved that the employee was cautioned concerning, or could be presumed to realize, the secrecy of the information (7), (8). Practically all cases in which trade secrets have been involved have arisen through a breach of confidence by an employee. Courts do not hesitate to enjoin such an employee and others associated with him from disclosing or practicing the trade secret (6), (8), (9) and in some cases will award damages for past use. But when the secret is once published to the world it is lost, for persons obtaining knowledge of it innocently can hardly be enjoined from the use of such knowledge.

The protection afforded trade secrets against disclosure by employees is therefore limited. An interesting situation arises when an employee proceeds to patent a trade secret of a former employer. If the facts can be established, the courts may transfer the patent to its rightful owner, but even this action does not always completely recompense the employer. For example, the patent may not have been properly or broadly drawn and as a result may be valueless to its rightful owner.

Elaborate barbed fences and locked gates, supplemented by special police or watchmen, are necessary accessories of large industrial plants in some sections of the country. Such adjuncts provide adequate protection against prowlers, thieves and curious-minded folk, but the protection is not perfect from the viewpoint of the preservation of trade secrets. Only the largest plants can afford this type of protection and it may be fairly assumed that the trade secrets, if any, that exist behind the barbed wire are exceptionally valuable. Consequently the ambitious information seeker or paid spy simply walks in the front gate with the mass of workmen which every large plant must employ. He can do this easily, for such a factory always has some labor turnover and it is comparatively easy for the really determined scout to add himself to the payroll.

An elaborate system requiring "a pass from the office" of every stranger before he can be "passed to the inner mysteries" is sometimes regarded as very effective in maintaining a real secrecy in plant operation. Similarly, a "guest book" in which visitors must register is of some value. Such methods provide for a preliminary inspection of every visitor entering the factory and when some one is thus made directly responsible for the admission of visitors the chance of any secret information being absorbed by them is lessened. Nevertheless, such methods may prove to be double edged if it is later necessary to invoke the aid of the courts to enforce a trade secret. The fact that the public had been admitted in very limited numbers, almost entirely upon passes, was one of the controlling facts that led the federal court in the Tubbs case to hold that there were no real trade secrets, because of such disclosure (10).

"Verboten" Signs Ineffective

"No admittance" signs are found inside and outside of practically every chemical plant. The reader knows how such signs inspire the "nosey." The existence of these cautions cannot be successfully invoked in court against an ex-employee as evidence of the fact that the manufacturing operations were secret. One sign, "Trespassers Will Be Persecuted," was erected by a Teutonic foreman and was notoriously ineffective (11).

Obviously the best location for the practice of a secret process is the top story of a building behind lock and key where none but trusted employees have occasion to work or pass. Such a plan provides a degree of real secrecy and is sometimes looked on favorably by the courts. In the Dow case (11) facts similar to the foregoing were advanced, but other pertinent items influenced the court to an adverse decision. In this case, however, the supposed secret operations were carried on in towers, and a reasonable suspicion existed that the arrangement was more largely influenced by a desire for "gravity flow" than by consideration for secrecy of operation.

On the other hand, in the Eastman case (8), the fact that the secret ingredients and apparatus were kept under lock and key influenced the court to regard the claim of secrecy favorably, and to sustain the trade secret.

In operating chemical processes, disguise is sometimes resorted to and substances are given fictitious names (11), colors or odors. Useless ingredients are sometimes added and extra and useless equipment is employed. Such subterfuges may deceive the workmen, but they offer no protection against the ambitious and determined "sample-taker." For example, the writer knows of a case in which data for use in a patent infringement suit were obtained without even entering the confines of the plant in question—by the simple and obvious method of sampling the effluvia from the process sewers and detecting the suspected chemical by analysis.

If the secret process is of such character that it is known and used by only a few trusted and confidential employees, the situation for the maintenance of secrecy is ideal, and most trade secrets sustained by the courts have been of this character (7), (8), (12), (13). Nevertheless, concentration of information does not provide for "ironbound" secrecy of operation, as the

corruption of but one trusted employee may throw the secret open to the world—as was outlined above.

When the secret is of such a nature that large numbers of workmen are involved in its practice, the situation described above is reversed and greatest secrecy is maintained if the work is divided in such a manner that none of the workmen has complete knowledge of the process and the real secret is still preserved in the minds of a few executives or foremen. Rules preventing employees from visiting other departments are helpful and evidence of this practice has been viewed favorably by the courts in the Eastman (8) and Sticky Fly Paper (12) cases. In the latter case, secrecy regarding the types of machines used was preserved by ordering various parts from different factories and assembling them secretly. Here again, however, the defaulting of one trusted employee, followed by a disclosure to an innocent third party, will destroy every vestige of the cherished trade secret.

The reader can readily draw his own conclusions, from the data presented, as to the merit of attempting to maintain a policy of trade secrecy in plant operation. The first and obvious rule in these matters is to patent whatever is patentable when adequate and valuable protection can be secured.

REFERENCES

1. Revised Statutes, Sec. 4886.
2. Natl. Phonograph vs. Lambert, 142 Fed. Rep., 164.
3. Macbeth Evans vs. Gen. Electric, 246 Fed. Rep., 695.
4. Macbeth Evans vs. Schnelbach, 239 Pa., 76; 86 Atl. Rep., 688.
5. Herold vs. Herold China Co., 257 Fed., 911.
6. Westervelt vs. National Paper, 154 Ind., 673; N. E. Rep., 552.
7. Simmons Medicine vs. Simmons, 81 Fed. Rep., 163.
8. Eastman Kodak vs. Reichenbach, 20 N. Y. Sup., 110-6.
9. Salomon vs. Hertz, 40 N. J. Eq., 400.
10. Hamilton Mfg. Co. vs. Tubbs, 216 Fed., 401-3-7.
11. Dow vs. American Bromine Co., 210 Mich. Sup. Rep., 262.
12. Thum vs. Tloczynski, 114 Mich., 149.
13. Merryweather vs. Moore, L. R. (1892), 2 Ch., 522.

Tanning With the Aid of Electricity

The Electro-Osmotic Process Can Now Be Used With Existing Tanyard Equipment

By **Rudolf Ditmar**
Gratz, Austria

INCREASING development of water power, with consequent reduction in the cost of electrical energy in many localities, brings renewed interest in many electrical processes that have not been commercially feasible in the past. Such a development is the electro-osmotic process of tanning that has recently been improved a great deal by the Elektro-Osmose-Leder-Aktiengesellschaft of Berlin, with a factory in Bad Oldesloe in Holstein.

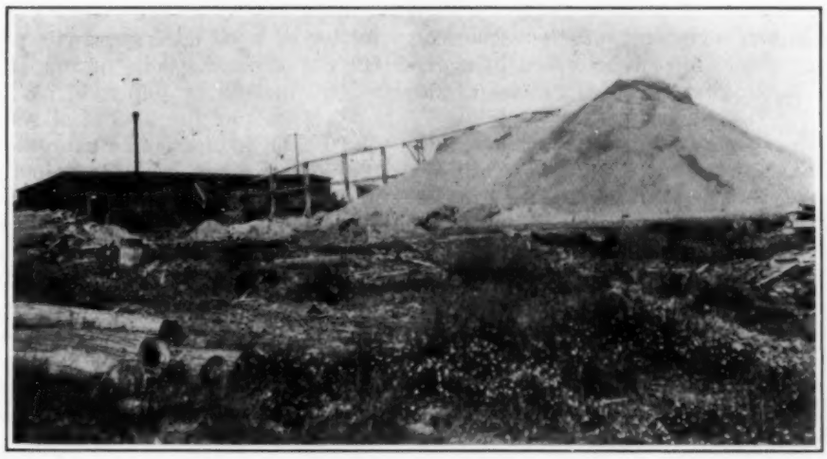
The new process has diaphragms that do not allow the tanning material to reach the electrode, but permit only a migratory movement of colloidal particles, etc., whereby all unfavorable side phenomena of older electrical tanning processes are entirely eliminated. The skins are soaked, limed, unhaired and delimed as usual and then colored in a preliminary manner in an old tan liquor containing hardly any tanning material. From here they go to the electric tanning pit. This is a standard pit divided by two suitable diaphragms into a large central tanning section and two narrow lateral electrode sections. In the lateral sections the electrodes are arranged on wooden frames. The hides, generally thirty-five of them, are freely suspended on rods in the central section, containing a vegetable tanning liquid of about 0.5 deg., Bé. of any desired composition. The direct current used, 110 v., 40 to 50 amp., acts on the skins for about 8 hours. Water passes out from the skin fibers, and the skin is charged positively, having a tendency to travel to the negative pole, while the negatively charged tanning material endeavors to travel to the positive poles. The skin, due to the discharge of water, assumes a shrunken condition, which might be likened to that of a squeezed-out sponge. At the same time a penetration with tanning material takes place. After the electrical preliminary treatment, the skins are brought into a normal vegetable tanning process, beginning with 1.5 deg. Bé., rising to 7 deg. Bé., absorb the tanning material quickly here and fix it, as a result of the opposite electrical charges, much more firmly than ordinarily without preliminary current treatment. After approximately 10 days, during which time the skins remain in each liquor for 2 days, they are finished, as regards the tanning, in layers containing bark and soaking liquid of 11 deg. Bé. After drawing, slow drying and setting, the leather is prepared in the usual manner.

According to the electro-osmotic process it is possible to tan 6 to 8 mm. skins in about 6 weeks time from green skins to finished leather—that is, in about half the time required without current treatment. With drum tanning, too, by inserting the electro-osmotic process half the time and therefore a great deal of labor can be saved, while the quality of the leather is improved, as the mechanical strain on the skins which affects the skin fiber unfavorably is substantially reduced.

According to the latest opinion of the German Experimental Station for Leather Industry in Freiberg, Saxony, a reduction of the tanning time and also a leather yield about 10 per cent higher, with reference to unhaired skin, is obtained by the electro-osmotic treatment. According to Prof. Dr. Paessler, these are highly important advantages as against the small current consumption. A special advantage of the leather made by the process is that, as against the leather otherwise tanned in strong liquids, it is subject to a very small washing loss with a favorable leather yield. The process requires no substantial change in the existing tanning establishment, as it can be installed in any plant without difficulty. Current is required for only about 8 hours according to the latest process and current consumption varies between 0.08 and 0.10 kw. per kilo of finished leather.

Any tanning pit can be provided with the electrical equipment which consists of two diaphragm frames of wood, two electrode frames of wood, and two diaphragms as well as two electrodes with electric leads. It is, of course, taken for granted that there exists a direct current source of 110 v. and 7½ hp. per pit of thirty-five hides within 8 hours working time.

The electro-osmotic process has already been adopted in the Elektro-Osmose Leder A. G. at Bad Oldesloe in Holstein, in the first Stadtlau Leather factory in Vienna and in the Pännonia A. G. in Hungary.



The Practical Conservation of Timber

A National Conference Called to Evolve a Plan and a Policy for Better Utilization and a Longer Life of Wood

Editorial Staff Report

ONLY one-third of the timber cut from American forests is usefully employed. Well-established methods of industry would save nearly 25 per cent more of the total timber cut if nationally applied. These two facts furnish the basis for the call of the first national conference on utilization of forest products, which met on invitation of the late Secretary of Agriculture Wallace in Washington on Nov. 19 and 20.

The purpose of this conference was the establishment of some plan to increase the effective use from the present three-ninths of the total cut to the entirely practicable five-ninths. Several hundred delegates representing every branch of timber growing, lumber manufacture and consuming industries assembled for the vigorous 2-day session. Throughout this conference it was evident that the increased application of technology is to have its important part in solving the problems of efficient wood utilization. And research was repeatedly stressed as the basic need.

Practical Measures Demanded

Opening the conference President Coolidge made it clear that this gathering must get down to serious, practical matters; a tangible specific program for action was needed. This keynote of the conference struck by the President at the very outset was briefly summarized by him as follows:

> The government is going to ask you to consider definite plans for reducing timber waste. It is going to suggest that out of this conference shall emerge a program of specific action for timber-saving rather than a mere expression of ideas. Containing as it does leaders from every branch of forest industry and from many interests closely allied with forest industry, this conference has, I know, the ability and the will to create such a program.

A National Conservation Policy

As a part of his address the President took occasion to speak of the conservation of natural resources. In the final paragraph of his address he gave the following expression, which can properly be taken as an announcement of the policy for the coming administration:

> We hold the resources of our country as a trust. They ought to be used for the benefit of the present generation, but they ought neither to be wasted nor destroyed. The generations to come also have a vested interest in them. They ought to be administered for the benefit of the public. No monopoly should be permitted which would result in profiteering, nor on the other hand should they be indiscriminately bestowed upon those who will unwisely permit them to be dissipated. These great natural resources must be administered for the general welfare of all the people, both for the present and for the future. There must be both use and restoration. The chief purpose of this conference is to discover policies which will, in the hands of private individuals and of public officers, tend to the further advancement of this already well-defined and securely adopted principle.

Organization Committee

In order to give more permanent form to the forest conference it was proposed at the outset that there should be a committee to receive all recommendations and suggestions of the delegates and to formulate a plan for permanent organization, if such idea seemed desirable. This committee of about twenty-five members worked diligently under the chairmanship of A. C. Goodyear, president of the Great Southern Lumber Co., and with A. R. Joyce as secretary. At the last session of the conference this committee reported with the recommendations outlined below. While awaiting the deliberations of the committee, the conference listened to a group of important technical papers discussing various causes of timber wastes and conspicuous advances that have been made in efficient utilization or preservation of timber products. Several of these papers, which are reviewed briefly here, afford an interesting basis for consideration of the problem by the chemical industries as a whole.

Timber Preservation

Railroads in the United States directly and indirectly use approximately 25 per cent of all of the timber products made; and they spend annually for these timber products nearly a quarter billion dollars. It was particularly appropriate, therefore, that a

paper of R. H. Aishton, president of the American Railway Association, should have been given to a discussion of methods to eliminate all decay losses of the wood in service.

The railways were pioneers in wood preservation, beginning this practice in 1838. Today the railways use approximately 90 per cent of all treated timber, including millions of ties, planks, posts and timbers. The economic advantage of this treatment is illustrated by the fact that treatment of approximately one-third of the new ties purchased has resulted in a reduction of demand by approximately twenty million ties per year. It is estimated that treatment of the remaining ties would afford still further reduction by forty-five million ties per year in the current demand for timber. Obviously this field, though already important to the wood-preserving industry, is far from saturated.

Commenting on this same subject, Colonel W. B. Greeley, chief of the Forest Service, in his opening address contrasted the life of untreated and treated railway ties. A high-grade tie costing about $1 delivered has a probable useful life of 6 years. If treated with zinc chloride at a cost of about 20 cents per tie, the probable life is 13 years. Thus the average annual material cost is 16 cents for untreated, but less than 10 cents for a treated tie. The industrial pocketbook nerve should respond to this impulse.

D. C. Everest, secretary and general manager of the Marathon Paper Mills Co., prepared for the conference a paper on "Prevention of Decay and Substitution of Other Species in Pulp and Paper Manufacture." He pointed out that official estimates show a loss during storage of at least 10 per cent of the pulp wood supplies cut in the United States. Wholly practicable methods eliminate substantially all of this. Proper piling of the pulp wood with ventilation, piles elevated off the ground, proper bark removal and piling on cinder-covered land instead of upon the trash from previous piling were some of the improvements urged.

It was also pointed out that the present yield of pulp, less than 50 per cent of the wood consumed, still affords a wide margin for improved practice in pulp manufacture. One of the great needs is further research information; and Mr. Everest urged that the splendid work of the Forest Service in research be encouraged by more nearly adequate appropriations. These investigations would be directed toward the protection of wood during growth, proper storage methods, the use of more species of timber, and pulp-plant methods for increasing pulp yield. With particular reference to the work of the Technical Associations of the Pulp and Paper Industries he expressed the point that more real advance had been made in the past 10 years than in all the previous history of the industry. But he ventured to forecast that a still greater advance could, and probably would, be made in the next 5 years.

A. C. Goodyear, president of the Great Southern Lumber Co., described another equally striking industrial development for complete forest utilization. His company a number of years ago received an elaborate report on the complete utilization of the timber resources that it was about to develop, but did not follow this recommendation completely at the start. During the war period, however, the addition of a kraft pulp mill was made the first step toward completion of the program. Barely 4 months ago this program was rounded out and now the largest waste burner of the South stands idle, "a monument to past destructiveness."

Magnificent Timber Used for Stove Wood in a Lumber Camp. Transportation Difficulties Often Put a Low Value on Big Logs

The present practice of this company includes turpentining of the trees 2 years before cutting, turpentine recovery during kiln drying of lumber, and turpentine extraction from wood pulp chips. Handles, lath, shingles and other small articles are made from small-sized pieces; but pulp mill, paper mill and liner-board mill take not only species undesirable for lumber making but also mill waste from the saw mills. A central power plant supplying power and heat consumes sawdust and shavings. Thus the great waste burner, that cost $75,000 and has consumed more than 3,000,000 cords of wood in the past 16 years, remains only as a stand-by unit for use in case of accident to these by-product plants.

Mr. Goodyear concludes that such forest development will place the lumberman in the public mind outside of the class of "forest butcher," a man "popularly regarded in much the same position with respect to public interest as the bootlegger."

To give permanent organization for the united efforts of manufacturers, distributors and users of wood products, the organization committee of the conference made a brief but very comprehensive report. It was desired to have a broadly representative group in which the burden would not fall on a few, nor the financing be difficult. This, the organization committee believed,

would be best accomplished by asking the Central Committee on Lumber Standards to serve as a nucleus and for this purpose to function as "The Central Committee on Utilization of Forest Products." This recommendation was unanimously approved by the conference. Unless this Central Committee declines such responsibility it will, therefore, serve as the working group for further conferences and for the stimulation of co-operation between all branches of the forest industry.

Research Need Emphasized

That research of all kinds was to be at the basis of all further progress was emphasized throughout the conference. And as the final section of its report, the organization committee summarized this need as follows:

A comprehensive program of research such as has been indicated requires the participation of federal and state agencies, the forest schools and other technical institutions, and the forest industries. Certain investigations lie largely within the province of the federal government, such as the proposed timber survey, a national study of woods and sawmill waste and laboratory studies which require large and expensive equipment. In these, however, co-operation by other public agencies and the industries is essential. Basic research and many local studies will, as heretofore, be conducted by educational and technical schools. The individual states should provide means to enable their forestry departments to conduct independent research and to co-operate with the government. The industries can not only co-operate with the public and quasi-public research agencies, but, the committee believes, go much further than at present in research designed to meet their special problems.

The Central Committee on Utilization of Forest Products can render a great service in stimulating interest in research and can undoubtedly aid in securing greater support for research agencies. The committee will be in a position to point out to the research agencies the problems of special importance to the industries that need investigation; and can exercise great influence in bringing about a larger participation in active research work by the various industries.

28 Per Cent of the Original Stand of Lumber Left by the Lumberman to Rot

The Birth of an Industry

A Dramatic Story of the Rise From Ashes of Cloquet, Minn.

From an address by H. Oldenburg, Weyerhaeuser Timber Co.

Until the fall of 1918 the experience of Cloquet in timber utilization was much like that of other lumbering towns in the Lake States. Originally only large, well-developed trees were cut; then only such part as would make clear lumber. With changes in economic conditions and increased prices of stumpage and lumber, utilization in the woods became closer. For many years only white pine was logged, then Norway and finally Jackpine and other species large enough for long timber. Further utilization followed as these industries came in turn: a ground wood and print paper mill, sulphite mill, box factory and toothpick factory. The number of large sawmills had increased to five with an annual output of about 250,000,000 ft. Around these industries a city of 10,000 people had grown.

In the fall of 1918 it seemed that the end of Cloquet, as a large lumbering center, was near. The Cloquet Lumber Co. and the Johnson-Wentworth Co., owning and operating three of the mills, had a remaining timber supply of only 2 years, the Northern Lumber Co. an estimated supply for 8 years. With the closing of these mills would go in large measure the source of supplies for the other wood-using industries.

On the night of Oct. 12, 1918, came the terrible forest conflagration that wiped out the entire residence and business section of the city, all its schools but one, all its churches and public buildings, the entire mill plants and yards of the Northern Lumber Co., the planing mill and a large part of the Cloquet Lumber Co. The 10,000 inhabitants fled, leaving all their personal belongings to be burned.

The destruction was so complete that it cannot be imagined. The heat was so intense that everything burnable was completely destroyed, and the hurricane of fire carried burning embers and ashes miles away. Witnessing the conflagration, it seemed as though the very gates of hell had prevailed against Cloquet, and that the place that knew her should know her no more forever.

It was hardly believable that her people should come back, but they did. The early confusion was great. The railroad station and all traffic-handling facilities were destroyed, and the first quick shipment of relief, provisions and materials added to congestion and confusion.

The officers and stockholders of the lumber companies were deeply touched by this return of their old employees, and resolved to do everything in their power to give them employment and lengthen the life of their industries. What followed had its inception in this impulse, and has been a sort of evolution.

Northern Minnesota has literally millions of acres that are better adapted to growing timber than to agriculture. It grows the valuable white and Norway pine and spruce. Also, in great abundance, what the Secretary has called "little-used species," and what with us had been termed "weed woods," the rapidly growing aspen, birch and Jackpine. While our growing season is short, these species collectively grow so thickly that the total annual wood production equals that of milder regions. All these species grow naturally and constantly, and if fires are kept out and all of them are profitably used and waste is eliminated, the number and variety of our timber-using industries could be multiplied many times and continue to serve humanity as long as the world endures.

Our lumber mills have been restored to a capacity of 150,000,000 ft. per year. The box factory of the Rathbone, Hair & Ridgeway Co. uses 20,000,000 ft. annually of short material in its daily output of about 7,000 boxes. The toothpick factory of the Berst-Forster, Dixfield Co., is using annually 2,000,000 ft. of white birch logs in its daily output of 62,000,000 toothpicks, 250,000 tongue depressors, 500,000 swabs and 400,000 clothespins. The paper mill of the Northwest Paper Co. has been manufacturing from spruce and balsam about 60 tons of print paper per day. This mill has been entirely reconstructed and enlarged so as to use 100,000 cords per year of our little-used species, aspen, birch, Jackpine and tamarac, in making book and wrapping papers. We are not yet producing standard stocks in commercial volume, but what has been accomplished gives assurance that the product of these "weed woods" will make the best book and wrapping papers manufactured.

The equivalent of a million and a half acres of annual growth of wood is thrown on mine dumps because of decay—Much of it is preventable

The Wood Conversion Co. was primarily organized to utilize mill waste. It has developed the process of making balsam wool, for insulating, sound deadening and other purposes, from the screenings of the paper mill and mill waste and will manufacture and will sell this year about 7,000,000 ft. It has conducted extensive experiments and costly operation for the development of a synthetic board from mill waste know as hog feed, and much progress has been made. Other factories are using some of these products. For instance, the G. & W. Sash Co. is expanding into a large plant, and in part uses balsam wool and synthetic board in the construction of refrigerators. The Commercial Woodworking Co. is using mill waste for making paper roll plugs, paper frames, wire reels and other specialties.

This work has restored Cloquet. It is a city of beautiful homes, churches, schools, public buildings, parks and successful business houses.

You will note that these developments are along three distinct lines: The manufacture and utilization of lumber and wood in an increasing variety of ways and down to the smallest pieces; the utilization of all the fiber woods in the making of paper and fiber products; the utilization of the sawdust, bark and refuse from all of these processes—utilizing everything but the whispering of the tree tops. These developments are by no means at an end, but will multiply and intensify complete wood utilization.

Combating Waste in Many Industries

From an address by C. H. MacDowell, Armour Fertilizer Works'

The individual, organization or state holding or developing a natural resource should in the public interest be charged with the responsibility of proper administration. In the earlier days of our industries we were favored with a large supply of raw materials easily procured and cheaply transported. Fuel was plentiful and widely distributed. The great shortage was labor, and necessity forced an unusual development of labor-saving machinery. The recovery yield was secondary, although competition in some lines had its effect. In European manufacturing countries, where raw materials were not so abundant and where labor was plentiful, the trend was toward a more complete utilization of raw materials. The European early made greater use of chemical research than we of America —our genius ran more to engineering as better solving our problems. Today we are making large use of an unusually competent staff of research and executive scientists. In recent years the chemist and metallurgist in this country have made progress even beyond that of their European fellows. Our utilization of low-grade ore bodies and recovery of dilute wastes are not excelled in any country.

In many mining operations a point is reached in recovery beyond which it is not good practice to venture, as costs would be excessive and above competitive asking. If these decisions are made by competent engineers and carried out by able superintendents, we of today cannot justly find fault. It is the avoidable waste—the waste that comes from incompetent handling, from inadequate equipment, from technical ignorance, and above all from greedy exploitation of the cream for the profit of the day at the expense of the future—that we can properly criticize and take steps to remedy.

Fuel—that is, coal and oil primarily—gives us a most glaring example of the present-day tendency to

waste our resources and opportunities. Inefficient boiler room practice causes perhaps the greatest waste of coal in industry. In mining, the amount of coal left in the mines under present competitive conditions runs from 10 to 50 per cent of the total tonnage. Use of coal strata and pillars for overhead protection in place of artificial supports is common practice. Removal of penalties for the production of fines by the miner has resulted in the raising of the percentage of screenings in Illinois mine run coal from 19.6 per cent to 48 per cent.

During the 4 years 1920-23 approximately 179,000,000 tons of coke was produced in this country. Of this, 52,500,000 tons, or about 30 per cent (requiring 87,500,000 tons of coal) was produced in the old-style beehive ovens. These save no byproducts. Had this 87,500,000 tons of coal been coked in modern byproduct oven, an additional 10 per cent, or 8,750,000 tons of coke, over beehive recoveries would have resulted.

Corner post set directly in the ground without preservative treatment. 15 per cent of our annual production goes for replacement of decay

There would have been produced 26 lb. per ton, or 1,139,289 tons of sulphate of ammonia. Proportionate quantities of gas, tar and benzol would have been recovered. A total money value of more than $382,000,000, or more than $95,000,000 a year, was wasted. Modern developments in low-temperature carbonization and destructive distillation giving more and better gas and increased tar and sulphate of ammonia recovery, together with utilization of this gas for boiler firing in a new type of boiler giving unusual efficiency, give promise of far greater economies than even present improved practice.

Fire kills 15,000 Americans a year and destroys more than $500,000,000 worth of property. This is an average of $4.50 per capita. The average per capita fire loss in Great Britain, France, Italy, Germany and other European countries is less than one dollar. Our traditional carelessness, types of construction and lack of personal liability for negligence are the main contributing factors to the enormous losses by conflagration in this country.

How much of this is preventable is problematical. Certainly a large proportion. Better electrical and heating installations and insulation; better plant sanitation and inspection; better types of construction; better design in hazardous occupations; all these will go far toward removing this unnecessary menace to production.

Tremendous economies have been made by the reduction in varieties of products manufactured in this country. For instance, there were 66 different sizes of vitrified paving brick being manufactured. After three revision conferences with manufacturers, this number

Railroads use 25 per cent of the wood production of the country and half of all that goes into ties is replacement for decay

was reduced to five, which fills all needs. Like reductions were made in hundreds of other articles.

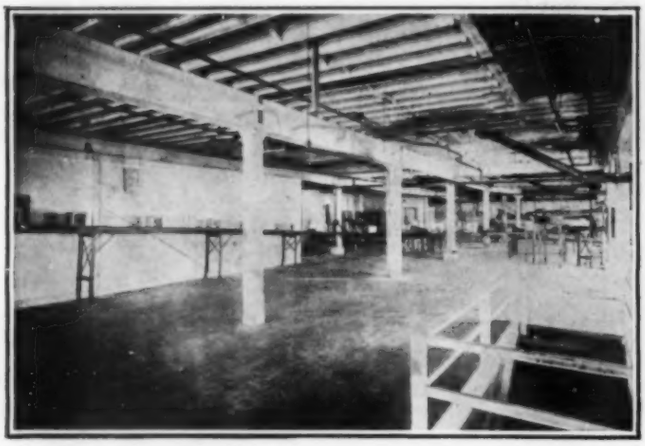
In doing away with some of the waste in industry it is necessary to study the make-up of the materials handled and ascertain their extreme possibilities. This can be done in the private research laboratory, through the industry maintaining research facilities jointly, or in co-operation with government and state research laboratories. Much work has already been done and a great deal of data are at hand, if we will only make use of them. Some of us may in the frame of mind of the farmer who wouldn't subscribe to an agricultural paper on the plea "I hain't afarmin' now half as well as I knows how."

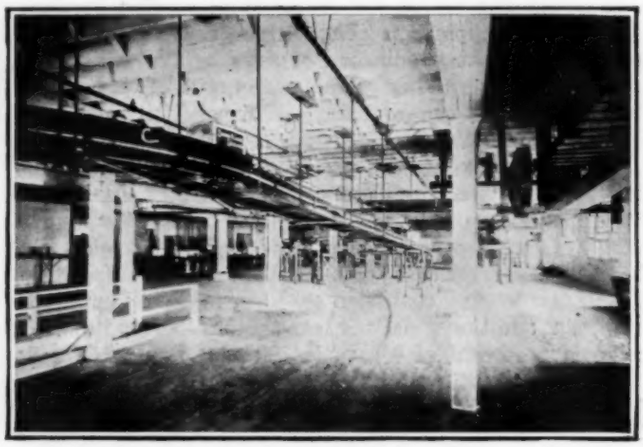
The examples of waste mentioned above are typical of all branches of industry and all lines of human endeavor. The human element enters into the problem in the most vital way. The entire personnel must be educated to the fine points of the question involved. Executives must be made to realize the necessity for the conservation of our material resources. Superintendents and operation directors must be made to recognize the necessity of carefully following the plans and outlines of technical specialists. The mechanic and laborer must be made to see the cost of wasted endeavor, whether it be in spoiled material or in useless labor. Only by having all thoroughly appreciate, as far as they are able, the relationship of each step in production to the final cost of the end-product can the facts be driven home.

Aside from any material results for present generations, a debt is owing to posterity. Granting that new thought will devise new methods, it yet is our duty to preserve for future generations all possible natural resources. Intensive education of all classes in the fundamentals of these principles is necessary to achieve results.

After the biscuits are baked, cooled and packed, the cartons are placed on conveyors—long lines of slightly sloping gravity roller conveyors—and move off under the impetus of their own weight toward storerooms and shipping rooms. Conveyors from various departments converge in this way toward one common point.

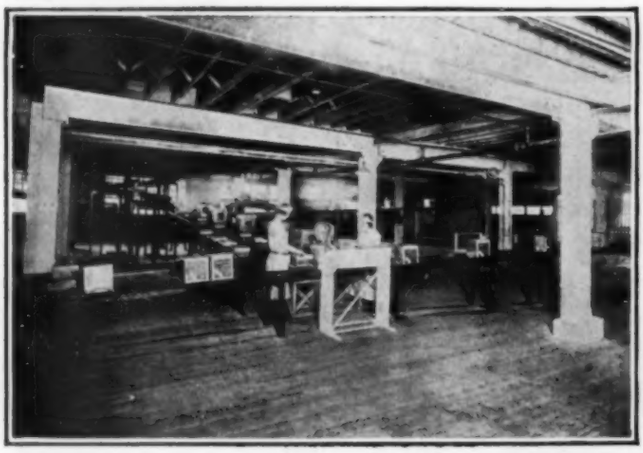
Some of the cartons come down from the upper floors of the building on roller spirals, while those from the floor above come on straight gravity conveyors alone if the distance is great enough, otherwise a short chute or slide of polished steel is used to accomplish a sudden drop without attaining too high speed.





Gravity Conveyors for the Shipping Room

CERTAIN types of manufacture lend themselves particularly well to the use of fixed conveyors for handling the finished goods from the packing or filling department to the storeroom and shipping floor. This is particularly true of industries where the product is shipped in standard containers of constant size and weight. And for a great many such plants, no power need be used, gravity conveyors serving the purpose as well as they do in the biscuit and cake bakery where the accompanying pictures were taken.



The cartons reach the central point on four lines of gravity. Here two workers stand, the only workers that the system requires, each one of whom is equipped with a scale. The cartons are weighed, the weight recorded and marked on them and they are then speeded on their way on the conveyor at the left toward the storage department and shipping platform.

Here we see the long run of gravity through the storeroom. The cartons can be removed as shown and piled according to the type of goods contained, or they may go directly on through to shipment. When loads are to be taken out of storage and shipped they can be made up in this room and placed on the conveyor, whence they pass out to the loading platform beyond.

Equipment News

From Maker and User

Pyrometers

At the recent International Steel Exposition in Boston, the Republic Flow Meters, Inc., Chicago, Ill., exhibited a line of indicating and recording pyrometers and accessories that embodied many novel features. The recording instrument, Fig. 1, uses two independent charts, instead of printing two scales on one chart. This permits any combination of scale ranges desired. Charts are each 6 in. wide and the actual scale range is 5¼ in. The clock is claimed to be of superior construction. It performs no other function than to release, through a second or power escapement, the operating energy. This prevents any power being exerted through the timing escapement, so that the timing is not influenced by the quantity of reserve power that remains in the springs.

A tear groove directly at the driving drum permits extraction of the record instantly without waste of chart. A clutch on each driving drum permits the operation of either or both charts at will. The charts are 1,200 hours long. A carbon ribbon is automatically advanced across the face of the chart and the instrument pointer moves freely between a depressor bar and the back of this ribbon. The pointer deflects in proportion to the temperature at the hot junction of the thermocouple and there is no frictional resistance at the pointer. Just before the depressor bars come down, the carbon ribbon comes forward, covering the knife edge, which runs the width of the charts and is located directly beneath the depressors. When the carbon has advanced to cover the knife edge, the depressors drop and a dot is made on the face of the chart. The depressors then rise, the carbon is moved back into place and the dot that has just been made is visible.

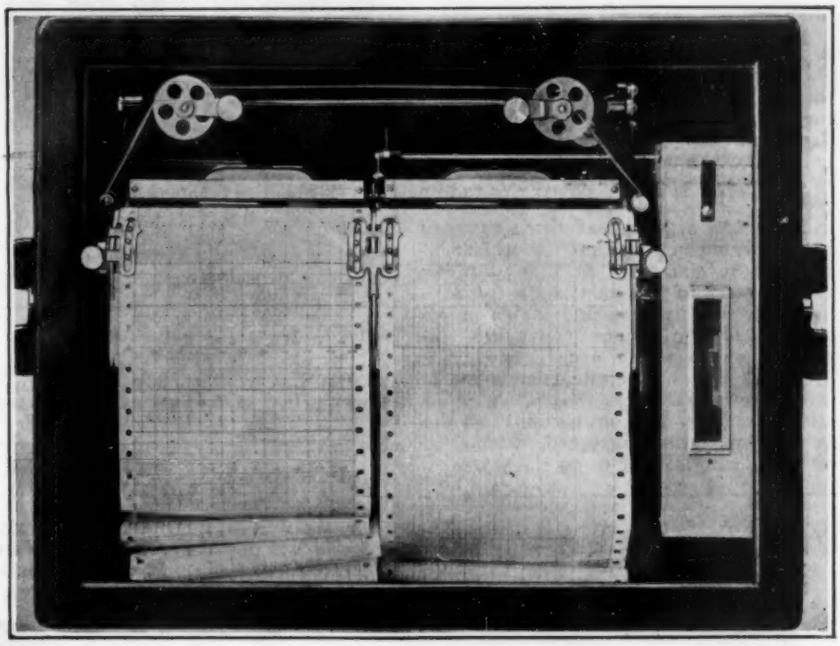


Fig. 1—Two Chart Recording Pyrometer

The charts have 20 deg. F. to each division, even with maximum reading of 3,000 deg. F. The mechanism is all mounted on a swinging bracket. Every detail of the complete instrument is visible and reachable without first removing other assemblies. The bracket on which all mechanism is mounted also forms a cover for the electric system which is attached to the back of the bracket.

Fig. 2—Indicating Pyrometer With 12 Point Switch

An instrument of this type will permit almost instantaneous checking of the temperatures in twelve different parts of a heating system, a valuable service with such equipment as traveling ovens and tunnel kilns.

Fig. 2 shows the indicating pyrometer of the wall type with 12 point rotary selective double pole switch. The case is moisture proof. The instrument is provided with a long scale with open gradations. A small toggle switch, marked "on" and "off," damps the pointer when not in use.

Four standard thermocouple elements are made to go with these instruments. They are platinum—platinum-rhodium; nickel — nickel-chromium; nickel-chromium—constantan; iron, constantan. The thermocouple heads are inclosed and moisture proof, of die castings and molded bakelite, as are all other possible parts of the instruments. The head is tapped for flexible conduit.

For the purpose of insuring accurate reading, these instruments are built very high in resistance—in fact, it is claimed that no other standard, double pivoted pyrometer has as great resistance per millivolt.

Belt Conveyor Idlers With Roller Bearings

The Stearns Conveyor Co., of Cleveland, Ohio, has put into successful use a special belt conveyor idler, equipped with Timken roller bearings, which is said to eliminate many of the difficulties encountered in the operation of idlers. The Stearns device is being used in connection with the company's complete installations of material handling equipment, but they are so designed as to make possible their use to replace any type of carrier now installed.

The pulley shells are made of No. 10 gage pressed steel, drawn together with rod bolts. The through pulley shafts are fitted with Timken roller bearings, of the same size as are used on the front axles of Ford automobiles. The size of this bearing allows a very large factor of safety for wear, but when wear does begin, it can be compensated for by means of the adjusting nut at one end of the shaft, without removing the pulley from the carrier.

The bearings are carried in heavy steel tubes inside of the pulley shell. These tubes also serve as a grease reservoir. One of the features of the Stearns carriers is their method of applying high-pressure lubrication. Grease applied to the high-pressure fitting on the end of the shaft enters

the grease reservoir near the center of the pulley, forcing the worn-out grease from the bearing out through the labyrinth washers. The grease seal thus formed prevents any dust or grit from entering the bearing. These pulleys require greasing not more than once or twice a year, and to do so it is not necessary to remove the pulley from the carrier. The grease is applied through the high-pressure fittings shown at top of shaft in Fig. 1.

The malleable iron pulley brackets are supported on a steel angle base, the ridge of the angle turned up. This has the advantage of being self-cleaning. Material cannot build up on the base and wedge the pulley so that it cannot turn, a saving not only in power but in wear and tear on the belt and pulleys.

While the first cost of these carriers is slightly more than that for other carriers, it is claimed that they pay for themselves in a few months, in the saving in power, up-keep and maintenance costs. On the longer conveyors, especially those which are inclined, the first cost for the complete conveyor is said to be actually less than when using other carriers, for on account of the saving in power consumed, a smaller conveyor can be built to do the work.

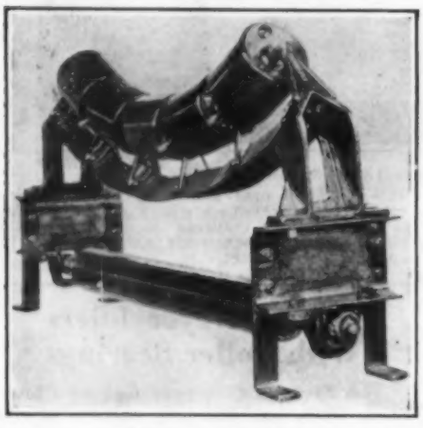


Fig. 2—Assembled Carrier Seen From End
This view well shows how the angle support is used and how its edge-up position prevents the lodgement of material.

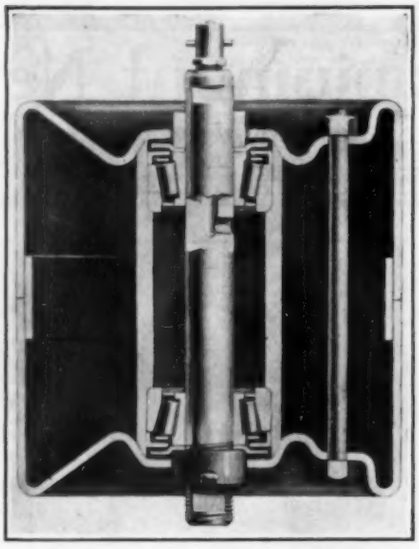


Fig. 1—Section of Roller Bearing Belt Conveyor Idler
Note the through bolts that hold the assembly together, the high-pressure lubricator in the shaft end and the grease reservoir made by the bearing housing.

Flexible Coupling

The flexible coupling shown herewith is made by the Terry Steam Turbine Co., Hartford, Conn. It was originally developed for use in connection with that company's steam turbine, but has now been placed on the general market for use with all types of equipment.

This coupling is of the pin and bushing type and of simple construction, as can be seen from the cut. The flanges are of forged steel, machined all over. The pins are of steel, hardened and ground. They are provided with screw heads and fiber washers to keep the rubber driving bushings in their proper place within the driven flange. The bushings are made of specially manufactured rubber, threaded on flanged steel spools which serve to protect the bore and ends from wear.

The manufacturers claim certain advantages for this coupling, among which are:

It compensates for both angular and off-center misalignment.

It allows free end float of the connected shafts and will not transmit end thrusts.

No special tools are required to disconnect it.

By removing the pins, the shaft of either machine may be moved vertically up or down without disturbing the other machine.

It is easily and quickly checked for alignment.

The driving flange is provided with a lip to protect operators.

It does not depend on metal strips, rubbing surfaces, or any other unreliable medium for its flexibility.

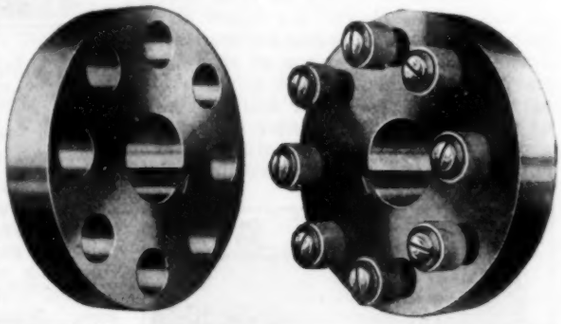
It requires no lubrication.

It has a tendency to prevent the transmission of shocks.

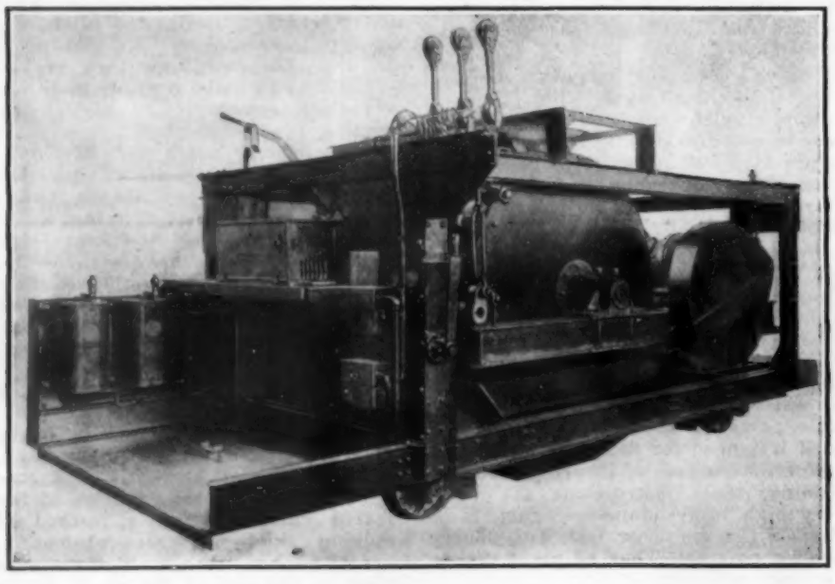
It acts as an insulator between the two machines.

It is designed to operate in either direction or rotation.

This coupling is manufactured for machines having ratings up to 400 hp. at 100 r.p.m.



Batch Mixing Car for Glass Works



The picture herewith shows the new batch mixing car manufactured by the Link-Belt Co., Philadelphia, Pa. It is used for gathering the various materials of glass—such as sand, lime, cullet, etc.—and mixing them intimately before they are fed to the furnace. It is designed to travel under the material bins, on a track, taking from the discharge of each bin the proper amount of materials.

It consists of a steel drum of 4-ton capacity, mounted on a steel car truck. The drum is suspended from an overhead frame with a beam type scale. Six beams on the scale, each operating independently and automatically, permit the accurate proportioning of batches consisting of up to six different materials. While the car is traveling from one bin to the next, the drum is closed and rotated, thus saving time in the mixing operation. Power consists of two 10-hp. motors, one for travel and one for mixing.

U. S. Patents Issued Nov. 18, 1924

Continuous Furnace. John W. Anderson, Newcastle, Ind.—1,515,586.

Drying Machine. Gordon Don Harris, Islip, N. Y., assignor to Industrial Dryer Corp., Newark, N. J.—1,515,596.

Process for Clarifying Oil. Peter P. Hindelang, San Antonio, Tex., assignor, by mesne assignments, to Standard Fullers Earth Co., Inc.—1,515,597.

Method and Machine for Drying Paper. Thomas F. Pinder, Ardmore, Pa., assignor to Charles C. Orcutt, New York, N. Y. —1,515,614.

Method and Apparatus for Recovering Scrap Metal. Herman A. Poppenhusen, Hammond, Ind.—1,515,616.

Sheet-Glass Machine. Printiss M. Sellers, Mount Vernon, O.—1,515,625.

Mixing and Beating Machine. Henry Trust, Park Ridge, N. J., and Frank M. Ashley, Brooklyn, N. Y.; Josephine Trust, administratrix of said Henry Trust, deceased—1,515,633.

Age-Resisting Rubber Composition and Method of Producing the Same. Herbert A. Winkelmann and Harold Gray, Akron, O., assignors to the B. F. Goodrich Co., New York, N. Y.—1,515,742.

Method of Laundering. Ralph A. Airheart, Seneca, Mo., assignor to American Tripoli Co., Seneca, Mo.—1,515,647.

Electric Battery. Harry F. French and Raymond C. Benner, Fremont, O., assignors to National Carbon Co., Inc.—1,515,652.

Glass Sponge and Process of Making Same. Axel E. Bertelson, New York, N. Y. —1,515,653.

Grinding Mill. Thomas E. Burner, Carthage, Ill.—1,515,654.

Method of Regenerating Sulphurous Acid and the Heat of the Waste Gas From Cellulose Boilers. Hans Clemm, Mannheim-Waldhof, Germany, assignor to Zellstoffabrik, Waldhof, Mannheim-Waldhof, Germany.—1,515,656.

Process for Coating Aluminum. Thomas Charles Cole, Southbridge, Mass.—1,515,658.

Compound Plug for Tube Still Headers. Walter M. Cross, Kansas City, Mo. —1,515,661.

Drying Machine. Frank L. Furbush, Westford, Mass., assignor to C. G. Sargent's Sons Corp., Mass.—1,515,671.

Process of Purifying Textile Fabrics. John Marsden, North Dighton, Mass., assignor to Mount Hope Finishing Co., North Dighton, Mass.—1,515,691.

Mercury Zinc Anode for Sulphate Solutions. Christian John Wernlund, Tottenville, N. Y., assignor to the Roessler & Hasslacher Chemical Co., New York, N. Y. —1,515,712.

Process for Making Vanilla and Other Flavoring Extracts. August F. Wussow, Chicago, Ill., assignor to Price Flavoring Extract Co.—1,515,714.

Building Fabric Containing Reduced Lead Suboxide. Oscar Brandenberger, Zurich, Switzerland, assignor to the Firm Subox A. G., Zurich, Switzreland.—1,515,723.

Refining Material. Roy Cross, Kansas City, Mo.—1,515,733.

Fluid-Measuring Device. Frank J. Wagner, Shamrock, Okla.—1,515,762.

Machine for Finishing Glassware. Andrew J. Sanford and John B. Townsend, Newark, O., assignors to A. H. Heisey & Co., Newark, O.—1,515,793.

Process of Making Steel Ingots Free From Blowholes. Isaac M. Scott, Wheeling, W. Va., and Samuel Peacock, Philadelphia, Pa.—1,515,794.

Grinding or Disintegrating and Mixing Machine. Jacob William Spensley, Manchester, England.—1,515,798.

Method of Treating Spent Pickling Liquors. Earl P. Stevenson, Newton, Mass., assignor to Arthur D. Little, Inc., Newton, Mass.—1,515,799.

Fungicide and Insecticide. Harry C. Young, St. Louis, Mo.—1,515,803.

Method of Making Saturated Sheet Material. Henry C. Avery, New Brunswick, N. J., assignor to the Flintkote Co., Boston, Mass.—1,515,821.

Fleshing Machine. Morris Canter, South Norwalk, Conn.—1,515,836.

Furnace. William M. Duncan, Alton, Ill. —1,515,846.

Continuous-Heating Furnace. John F. Ferm, Pittsburgh, Pa.—1,515,851-2.

Compound for Retaining Hair in its Dressed Condition. William C. Foth, Chicago, Ill., assignor of one-half to Edwin C. Price, Chicago, Ill.—1,515,854.

Metal-Polish Compound. Esther E. Nelson, Chicago, Ill.—1,515,870.

Manufacture of Glass Containers. John F. Rule, Toledo, O., assignor to the Owens Bottle Co., Toledo, O.—1,515,885.

Dry Cell. William Micou Turnley, Toronto, Ont., Canada.—1,515,912.

Automatic Tile Press. Frank B. Yingling, Hamilton, O.—1,515,918.

Cube-Sugar-Packing Machine. Henry Dippel, San Francisco, Calif.—1,515,937.

Process and Apparatus for Separating Carbonaceous Material. Byron E. Eldred, Great Neck, and Robert N. Graham, Long Island City, N. Y.; said Graham, assignor to said Eldred.—1,515,942.

Coated Dry Cell and Process of Making the Same. Harry F. French, Fremont, O., assignor to National Carbon Co., Inc. —1,515,945.

Process for Treating Cocoa Beans. John A. Hall, Victoria, British Columbia, Canada.—1,515,947.

Air-Cleaning Material and Process of Making the Same. Chester P. Hegan, Louisville, Ky., assignor to Reed Air Filter Co., Louisville, Ky.—1,515,949.

Apparatus for Forming Articles of Glass. William J. Miller, Swissvale Borough, Pa. —1,515,962.

Electric Furnace. Harry C. Reagan, Boulder, Colo.—1,515,967.

Process for Purifying Liquids. Eloi Ricard, Melle, France, assignor to Société Ricard, Allenet & Cie., Melle, Deux-Sevres, France.—1,515,968.

Apparatus for Feeding Viscous Materials. Bertrand E. Beyer, Paterson, N. J., assignor to General Norit Co., Ltd., New York, N. Y.—1,515,993.

Tank Construction. Ferdinand C. Buchanan, Kansas City, Mo., assignor of one-half to Andrew A. Kramer, Kansas City, Mo.—1,515,996.

Pressure-Retaining Valve. Eddy L. Clark, West Pittston, Pa.—1,515,998 to 1,516,000 inclusive.

Apparatus for Use in Manufacturing Mortar or Plaster. Thomas Sturtevant, Wellesley, Mass., assignor of Sturtevant Mill Co., Boston, Mass.—1,516,029.

Composition for the Removal of Paint, Varnish, Enamel, Grease, etc.—Frank P. Schmidt, Quincy, Ill.—1,516,064.

Coke Oven. Raoul Cravau, Brussels, Belgium.—1,516,082.

Regenerative Air Preheater. Frederik Ljungstrom, Lidingo-Brevik, and Nils Fredrik Filemon Andersson, Stockholm, Sweden, assignors to Aktiebolaget Ljungestroms Angturbin, Stockholm, Sweden. —1,516,108.

Liquid-Treating Apparatus. Frank N. Moerk, Philadelphia, Pa., assignor to Clarence P. Landreth, Philadlephia, Pa.— 1,516,112.

Method of Preparing Pickled Steel Sheets. Reginald J. Pugh, Youngstown, O. —1,516,117.

Glass-Drawing Bait and Holder for Glass-Drawing Machines Used in Processes of Drawing Glass. Hector Bazin, Detroit, Mich.—1,516,136.

Method of Hardening Iron. Donald McCormick Scott, Rochester, N. Y., assignor to the T. H. Symington Co., New York, N. Y.—1,516,157.

Photographic Developer. Nathan Sulzberger, New York, N. Y.—1,516,161.

Process and Apparatus for Recovering Gasoline From Natural Gas. Leo Wallerstein, New York, N. Y., assignor to Gasoline Recovery Corp., Del.—1,516,166.

Gas-Absorbing Apparatus. Viggo E. Hanson, Casper, Wyo., assignor to Standard Oil Co., Whiting, Ind.—1,516,187.

Production of Artificial Filaments. Leonard Angelo Levy, Cricklewood, England.—1,516,194.

Means for Protecting Flammable Liquids Stored in Bulk From Fire. Vahe Sevian, Bagdad, Turkey.—1,516,214.

Starch and Vegetable-Oil Extracting Machine. Robert Shorts, San Jose, Costa Rica. —1,516,215.

Water-Gas Apparatus. Linford Spearing Stiles, Brooklyn, N. Y.—1,516,217 and 1,516,218.

Method and Apparatus for Delivering Viscous Glass. Oliver M. Tucker and William A. Reeves, Columbus, O.—1,516,220.

Process of Manufacturing Cellulose Acetate. William R. Webb, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y.—1,516,225.

Roofing. Ray P. Perry, Upper Montclair, N. J., assignor to The Barrett Co., New Jersey.—1,516,243.

Steel. Karl W. Zimmerschied, New Rochelle, N. Y., assignor to General Motors Corp., Detroit, Mich.—1,516,262.

Process of and Apparatus for Refining Crude Oils. Claude Leslie Freeland, Bristow, Okla.—1,516,285.

Rotary Pair Furnace for Sheet Mills. Harry W. Irwin, Canton, O.—1,516,296.

Manufacture of Electrolytic Iron. Auguste Bouchayer, Grenoble, France, assignor, by mesne assignments, to Electrolytic Iron, Inc., Dover, Del.—1,516,326.

Purifying Liquids. Alexander Charles Cumming, Liverpool, England.—1,516,337.

Method of Chlorinating Acetylene. Koloman Roka, Constance, Germany, assignor to the firm of Holzverkohlungs-Industrie Aktiengesellschaft, Constance, Badenia, Germany.—1,516,350.

Accumulator Plate. Louis De Montmorency Cattley, Llandaff, near Cardiff, Wales.—1,516,373.

Arylhydroxynaphthylketone and Process of Making Same. Guillaume de Montmollin and Gerald Bonhote, Basel, Switzerland, assignors to Society of Chemical Industry in Basel, Switzerland.—1,516,376.

Process of Rendering Chlorides of Ketones Soluble by Means of Alkalis. Antoine Regnouf de Vains, Miribel, Ain, France.—1,516,377.

Hide-Stretching Apparatus. Alexander I. Snow, Worcester, Mass.—1,516,413.

Dip-Pipe Construction for the Hydraulic Main of a Gas Plant. Peter J. Hilliard, Canandaigua, N. Y.—1,516,432.

Drying Apparatus and Process. Gerald A. Lough, Plainfield, N. J.—1,516,444.

Manufacture of Indophenolic Bodies. Frank Douglas Miles, Ayrshire, Scotland.— 1,516,450.

Heating Stove or Oven for Drying and Other Industrial Purposes. Edward Procter and Hugh Walton, London, England. — 1,516,458.

Screen for Filter Presses. Alexander T. Stuart, Toronto, Ont., Canada.—1,516,463.

Method of Imitating Leather by Paint Process. Ervin Gage, Taft, Calif. — 1,516,466.

Leather Tanning and Finishing Gained in 1923

According to data collected at the biennial census of manufactures of 1923 the establishments engaged primarily in the tanning, currying and finishing of leather reported products valued at $487,600,580, an increase of 27.2 per cent as compared with $383,365,048 for 1921, the last preceding census year. The principal products of the establishments assigned to this industry classification are rough leather; sole and upper leather; morocco and colored skins; horsehides; calf and kip skins; goatskins and sheepskins; belting, harness, carriage, trunk, bag and pocketbook, bookbinders', and furniture leather; and leather for gloves, mittens, etc.

In 1921 the industry was represented by 608 establishments, the decrease to 602 in 1923 being the net result of the loss of 73 establishments which had been included for 1921 and the inclusion of 67 establishments which were new to the census. Of the 73 establishments lost to the industry, 34 had gone out of business before the beginning of 1923, 32 were idle during the entire year, and 7 reported products valued at less than $5,000 in 1923.

News of the Industry

Summary of the Week

Secretary Hoover's annual report emphasizes the Commerce Department's accomplishments in eliminating national waste.

Tanning research laboratory, gift of tanners' association, dedicated at University of Cincinnati.

Producers of nitrate of soda in Chile urge reduction in export tax to permit lower sales price in foreign markets.

The law suppressing the French match monopoly has been abrogated by the Herriot administration.

Court of Customs Appeals on Nov. 22 handed down opinion declaring cresylic acid dutiable at 40 per cent ad valorem and 7c. per lb.

Domestic magnesite interests may urge tariff amendment which will authorize transportation charges as part of production costs.

French and Swiss dye makers reported to have entered working agreement to meet German competition.

Unofficial reports from Japan say that phosphorus plants are in combination with supplies controlled.

Adjustment of Magnesite Duty Involves Transportation Costs

Complaint on the part of domestic producers of magnesite to the effect that the U. S. Tariff Commission is allowing consideration of magnesite duties to lag unnecessarily is met by a member of the commission with the statement that an adjustment of the rate of duty that will allow American producers to compete throughout the country involves the question of whether or not transportation expense may be included in the cost of production. Because of the expense of the rail haul from California and Washington, the domestic producers of magnesite face a disadvantage of $7 or $8 per ton in transportation costs.

In the debate on the tariff bill in Congress it was indicated very clearly that transportation is not to be included as a cost of production. Were it to be included, there are many who believe it would not stand in court. In the wheat case, Canada had an advantage of 9 cents in the cost of transportation. This was included in the adjustment of the wheat duty on the ground that the Canadian railroads are government owned and the favorable freight rate can be interpreted as a special grant from the government, which would bring such a cost within the terms of the statute.

Three members of the commission are not willing to include transportation as one of the costs which can be considered in the adjustments of duty. Even were it allowed, the difficult question then would arise as to the point at which transportation cost would be equalized. If an effort were made to equalize transportation costs at all points, it would mean hundreds of rates of duty. This could not be done, as the Constitution provides that duties must be uniform. If New York, the principal port of entry, were chosen as the point to which transportation costs would be equalized, that would mean that the equalization would be confined to New York, with the imported product suffering an increasing disadvantage as the rail haul westward would be added to its price.

Nevertheless the magnesite producers believe themselves to be entitled to an opportunity to compete east of Chicago. It is expected that they will prompt the introduction of an amendment to the tariff act which will propose the inclusion of transportation costs in determination of tariff rates.

Barium Carbonate Effective as a Rat Poison

The superiority of barium carbonate as a rat poison has been demonstrated so thoroughly, the Department of Agriculture believes, that it is doing all within its power to encourage the use of that poison in connection with its rat control campaign. New proof of the effectiveness of this poison has been had at the marine warehouses at Quantico, Va. The large stores of food and feed kept there were being preyed upon seriously by rats. An intensive campaign against them was carried on by the marines for a considerable period with indifferent success. Finally the biological survey was called in and through the use of its standardized barium carbonate baits the warehouses were freed of rats within a few days.

Norway Will Resume Mining of Pyrites

Production of pyrites at the important mines at Stord, Norway, is about to be resumed, it is indicated. These mines have been closed for 18 months. The increase in demand, which has been continual since the London conference, has reached a point where the property again can be operated.

French and Swiss Dye Makers to Form Working Agreement

Coincident with the announcement of a close combination reported from the aniline industries of Germany, whereas hitherto they were bound only by a tacit community of interests, the French Compagnie Nationale de Produits Chimiques is on the verge of making a working arrangement, to help in the struggle of meeting German competition, with Swiss manufacturers. Above all is this considered of moment at this time in that Germany is already making overtures for closer working alliance with British manufacturers of colors with a view to dividing possible world markets. At any rate, so far as France is concerned, it is possible that there will be a very sharply defined "dyestuffs clause" in the new Franco-German commercial treaty which is to go into effect in 1925.

"Institute Special" for the Pittsburgh Meeting

The Eastern delegation to the Pittsburgh meeting of the American Institute of Chemical Engineers, to be held Dec. 3 to 6, will leave New York from the Pennsylvania Station Tuesday evening, Dec. 2, on train 19. The schedule of this train is: Leave New York 8:20 p.m., Newark 8:43, North Philadelphia 10:21, Philadelphia 10:45 and West Philadelphia 10:50. It is due to arrive in Pittsburgh at 7:59 Wednesday morning.

Shippers Use Carbon Dioxide Gas in Place of Ice

The success that has attended the experiments recently carried out in the shipments of fish from Halifax, N. S., to Montreal, in which carbon dioxide gas was used in place of ice, has induced the company manufacturing this gas to establish a plant in Halifax.

Elimination of National Waste the Keynote of Secretary Hoover's Annual Report

Review of 3 Years Work on Unemployment, Superpower, Standardization and Simplified Practice—Trade Association Activities Discussed

"ELIMINATION of national waste" is the keynote of Secretary Hoover's annual report, made public at the Department of Commerce last week. Under this head Mr. Hoover reviews the accomplishments of the department during the first 3 years of the present administration, notably in the fields of unemployment, seasonal construction, coal, superpower, standardization, simplified practice, co-operative marketing and the reduction of housing costs. Trade association activities are discussed from the same angle. The Conference on Street and Highway Safety, to be held at the department this month, is referred to as an effort to cope with "the most challenging of all wastes—the waste of human life."

"A definite constructive national program has been developed for the elimination of waste in our economic system," says Mr. Hoover. "We have the highest ingenuity and efficiency in the operation of our industry and commerce of any nation in the world. Yet our economic machine is far from perfect. Wastes are legion. There are wastes which arise from widespread unemployment during depressions, and from speculation and over-production in booms; wastes attributable to labor turnover and the stress of labor conflicts; wastes due to intermittent and seasonal production, as in the coal and construction industries; vast wastes from strictures in commerce due to inadequate transportation, such as the lack of sufficient terminals; wastes caused by excessive variations in products; wastes in materials, arising from lack of efficient processes; wastes by fire; and wastes in human life.

"Against these and other wastes the department, acting always in co-operation with the industries, has for the past 3 years developed an increasingly definite program. As these manifold activities of the department are based upon co-operation with industry and commerce, none of them leads to paternalistic ends."

Many Wastes Eliminated

The program of the Northeastern Superpower Committee, under Mr. Hoover's chairmanship, is discussed as another effort in the direction of waste elimination. Revision of federal and state purchasing specifications, under the auspices of the Bureau of Standards, is still another. Industrial research work undertaken by the bureau, in co-operation with the industries concerned and with a view to improvement in technical processes, is still another. There was also established in the bureau a Division of Simplified Practice, to help eliminate the wastes arising from unnecessary diversification.

The Department of Commerce has also moved in the direction of eliminating distribution waste, the report reveals, by conducting an exhaustive investigation into the processes of marketing perishable produce. After summarizing the wastes of the present-day system, Mr. Hoover concludes:

"It has been the department's view that the best remedy for these evils lies in the extension of co-operative marketing and in the better organization of the distributors at the terminal markets. The department has already proposed a definite plan which I believe will mobilize economic forces to reduce these wastes with a minimum of governmental intervention."

Activities of Trade Associations

In the section of the report dealing with trade associations Mr. Hoover says:

"One of the most important agencies through which the elimination of waste may be promoted is the trade association. It is true that a small minority of these associations have been in the past used as cloaks for restraint of trade by such activities as open-price associations and other attempts to control distribution or prices. It is equally true that the vast majority of trade associations have no such purpose and do no such things. The dividing line, however, between what activities are in the public interest and what are not in the public interest is not today clearly defined either by the law or by court decision.

"In consequence of recent decisions of the courts many associations are fearful of proceeding with work of vital public importance, and we are losing the value of much admirable activity. At the same time we are keeping alive the possibility of wrongful acts. It is imperative that some definition should be made by which an assurance of legality in proper conduct can be had and by which illegality or improper conduct may be more vigorously attacked.

"Any collective activity can be used as a smoke screen to cover conspiracy against the public interest, but that is no reason for condemning all collective activities. Just because automobiles are sometimes used by bootleggers for the illegal transportation of liquor we do not prohibit their manufacture or their legitimate use."

Portland Cement Association Elects Officers

Blaine S. Smith, Chicago, Ill., Universal Portland Cement Co., has been elected president of the Portland Cement Association for the ensuing year. He succeeds F. W. Kelley, Albany, N. Y., who has acted in such capacity for the past 2 years. Lowell F. Burch, Atlas Portland Cement Co., New York, has been elected first vice-president; C. A. Irvin, Alpha Portland Cement Co., Chicago, second vice-president; and John W. Boardman, Detroit, Mich., Huron and Wyandotte Portland Cement companies, treasurer.

News in Brief

French Government Match Monopoly Gets New Lease of Life—The law suppressing the French match monopoly has been abrogated by the Herriot administration and reinstated as it was before abolished by the Poincaré régime. The profits from the monopoly for the fiscal year of 1923 showed 76,000,000 francs, approximately $4,000,000.

Metric System Introduced in Russia—The introduction of the metric system in the Soviet Union, says the *Commercial and Industrial Gazette* of Moscow, is proceeding rapidly. By the beginning of July next year the Gosmeter will have completed the inauguration of the metric system in all branches of national industry, including the retail selling apparatus in the provinces of Moscow, Leningrad and Nizhni-Novgorod.

Commerce Bureau Handles 5,000 Inquiries a Day—In a letter to Secretary Hoover summarizing the work of the bureau for the year ended June 30, 1924, Dr. Klein, director of the Bureau of Foreign and Domestic Commerce, pointed out that the work of the bureau has doubled in the last 2 years and during the year just ended the number of instances in which it has aided American business men has totaled nearly 1,250,000, with an average of more than 5,000 inquiries a day at the close of the fiscal year. On the basis of an investigation involving 3,675 inquiries addressed by business firms to the bureau it was found that the resulting business amounted to about $427 per inquiry. This would indicate several hundred millions in foreign trade secured for the United States as the result of answers to inquiries handled by the bureau during the year.

Ford Makes Record at Glass Works—New high production records are being established by the Ford Motor Co. at its glass palnt at Glassmere, Pa., formerly the works of the Allegheny Glass Co. During a period of 25 working days, 733,000 sq.ft. of finished plate glass was produced, said to be the largest amount ever manufactured in the same length of time by a similar size factory in the world. The installation consists of 8 furnaces, each carrying 16 pots, 52 in. in diameter; the daily cast totals 128 pots, each holding sufficient glass metal to roll from 295 to 300 sq.ft. of plate glass. The grinding department consists of 8 grinders, and 8 polishing tables, each 26½ ft. in diameter, are installed. The average daily production totals 80 tables of finished glass. The entire plant output is utilized for Ford automobiles.

Maddock Pottery at Trenton Closed—John Maddock & Sons, Trenton, N. J., manufacturers of sanitary ware, have discontinued operations at their local Coalport pottery on Muirhead Avenue, and will concentrate operations for the time being at their plant at Robinson, Ill. The business is one of the oldest in Trenton, having been established about 30 years ago and has been in continuous operation since that time.

Washington News

Decision Places Cresylic Acid on Dutiable List

Court of Customs Appeals Gives Opinion Which Settles Long-Standing Controversy

The long-standing controversy over whether cresylic acid is dutiable or free under the 1922 tariff act was decided Nov. 22 by the Court of Customs Appeals in an opinion declaring the chemical dutiable under paragraph 27, at 40 per cent ad valorem and 7 cents per pound.

The case at issue was an appeal by Lehn & Fink, Inc., from a decision of the Board of General Appraisers sustaining an assessment of duty on a shipment of cresylic acid. In an unanimous decision, delivered through Presiding Judge Graham, the court affirmed this decision.

Because of an apparent conflict between paragraph 27 of the dutiable list and paragraph 1549 of the free list, the question of cresylic acid has been before government agencies practically ever since the 1922 tariff act went into effect. Classification experts of the Treasury Department studied the subject for several months, finally deciding that the acid is dutiable. The argument entered into consideration of the cresylic acid and phenol case before the Tariff Commission also.

Question on Duty on Lower Grades

The higher grades of cresylic acid have been dutiable beyond reasonable dispute, but lower grades were imported in considerable quantities and admitted free, some of them being mixed with small quantities of pitch, until the ruling by the Treasury Department caused duty to be assessed on all.

Paragraph 27 makes dutiable ". . . all distillates of coal tar . . . which on being subjected to distillation yield in the portion distilling below 190 deg. C. a quantity of tar acids equal to or more than 5 per centum of the original distillate or which on being subjected to distillation yield in the portion distilling below 215 deg. C. a quantity of tar acids equal to or more than 75 per centum of the original distillate." Paragraph 1549 declares entitled to free entry distillates of tars "which on being subjected to distillation yield in the portion distilling below 190 deg. C. a quantity of tar acids less than 5 per centum of the original distillate."

Cresylic acid of the quality in question distills less than 5 per cent below 190 deg., but distills 75 per cent or more under 215 deg., thus giving occasion for the test case.

The Court of Customs Appeals held, in brief, that there is a double test provided in paragraph 27 and that if a distillate of coal tar meets either test, it is dutiable. Therefore, while cresylic acid meets the test provided in paragraph 1549 of the free list because it distills less than 5 per cent below 190 deg., it is held dutiable because it meets the second test of paragraph 27 by distilling 75 per cent or more under 215 deg.

Large Shipments of Wood Oil to Hamburg in September

Consul-General P. S. Heintzleman reports that exports of wood oil from Hankow, China, in September totaled 10,817,255 lb., of which 6,852,484 lb., valued at $816,918, was to the United States. The outstanding feature of the month was the heavy export to Europe, the bulk of which was destined for Hamburg. Prices increased during the month from $20.50 to $22.60 per picul (133⅓ lb.), owing to unsettled political conditions and the continued imposition of illegal taxes.

Statistics of Oils and Fats

The Department of Commerce announces that the factory production of fats and oils, exclusive of refined oils and derivatives, during the 3-months period ended Sept. 30, was as follows: Vegetable oils, 344,221,381 lb.; fish oils, 27,531,800 lb.; animal fats, 523,272,677 lb., and greases, 91,528,709 lb.; a total of 986,554,567 lb. Of the several kinds of fats and oils covered by this inquiry, the greatest production, 415,255,699 lb., appears for edible and neutral lard. Next in order is linseed oil, with 139,862,391 lb.; tallow, with 106,202,020 lb.; cottonseed oil, with 116,816,868 lb.; coconut oil, with 46,971,230 lb.; and corn oil, with 29,835,218 lb.

The production of refined oils during the period was as follows: Cottonseed, 94,633,666 lb.; coconut, 44,802,426 lb.; corn, 24,149,036 lb.; peanut, 979,042 lb.; soya bean, 59,700 lb., and palm kernel, 146,790 lb. The quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

Production of Liquid Gold in Russia

A report from Moscow says that for the special decoration of porcelain and earthenware products suitable for the Far Eastern market certain chemical products are required which are not manufactured in Russia. The large quantities of foreign products imported for this purpose, however, especially liquid gold, are subject to very high customs duties. The prices for export porcelain and earthenware consequently are on a high level and have reached a limit beyond which it will not be possible to sell the production of the Soviet ceramic industry to Eastern countries.

With the view of changing the position on the Eastern market to the advantage of the Soviet producers the Prodasilikat has approached the Council of Labor and Defense with an application for the return of duties collected on chemical products imported for the manufacture of the ceramic industry's export goods when the finished articles are exported to Eastern countries.

In this connection it is reported that a chemist working in the laboratory of the Dulievski porcelain factory has completed successfully experiments for the production of liquid gold. The necessary re-installation is being carried out at the factory and it is hoped that during November the production of liquid gold in quantity will be initiated. Efforts had been made in Russia before the revolution to produce liquid gold but were unsuccessful. The chemist in question, M. Tumanov, had been working on this matter about 7 years.

Proposed Increase in Freight Rates on Talc Suspended

Proposed increases in the freight rates on crude and ground talc from North Carolina producing points to points in Central Freight Association territory have been ordered suspended until March 25, to permit of an investigation by the Interstate Commerce Commission of the reasonableness of higher rates. The extent of the increase is indicated by the following example: The rate from Hemp, N. C., to Cleveland on talc in carloads, now is $5.71 per ton. Under the proposed increase that rate would be $6.69 per ton.

List Sought of Patents Owned and Controlled by the Government

An effort is being made by the Interdepartmental Patents Board to compile a list of all patents with which the government is concerned. There are several thousands of these patents. This is the first effort which has been made to centralize full information in connection with government patents and patent rights which the government has acquired from outside the government service. A questionnaire has been sent to all government agencies asking for data.

Immediately on the convening of Congress an effort is to be made to induce the Senate Committee on Patents to take up for consideration the bill that will empower the Patents Board to handle all matters pertaining to government patents and the patent rights it may acquire. The bill also authorizes it to issue non-exclusive licenses.

South Africa May Place Import Duty on Carbonate of Soda

Having entered upon a vigorous policy of stimulating domestic industries, the Union of South Africa is expected to levy a duty of 1s. 6d. per 100 lb. on carbonate of soda. That rate of duty has been approved by the Board of Trade and it is expected that the Minister of Finance will approve it. Antidumping safeguards also are recommended. Similar action recently was taken to protect the domestic cement industry. While this duty affects the Kenya Colony and British sources of supply principally, it does have an indirect bearing on world trade in that an outlet elsewhere will have to be found.

Synthetic Products Compete With Chilean Nitrate

Chilean Taxation and Higher Production Costs Factors in Sales Price for the Natural Product

Deep concern is being manifested by the Chilean Nitrate Producers Association because of the inroads being made in its trade by synthetic products. The situation of the Chilean producers has been made much more difficult by the reform program being put into effect by the Chilean Government. This promises to add very materially to their costs, which already were mounting rapidly. Recourse is to be had immediately to a research program. Foreign chemists are to be employed, in the hope that processes may be brought to a new plane of efficiency and other technical improvements realized.

The producers of nitrate object particularly to the new income tax. Since their commodity is the source of much of the Chilean Government's revenue, the feeling is that nitrate should not be called upon to pay other taxes. The new laws relating to labor contracts, workmen's compensation, compulsory insurance to cover sickness among employees, and conciliation all mean heavy expenditures on the part of the producers. These increases in the cost of production are in addition to regular costs, which have shown a tendency to rise since the World War.

The producers are frankly urging a reduction in the export tax that will permit lower selling costs in foreign markets. The association of producers is entirely committed to the policy of maintaining the lowest possible prices, but because of the increase in costs it is very apparent that higher prices must be asked, despite the fact that this means further encouragement for the production of nitrogen by synthetic processes and additional competition from other nitrogeneous materials.

Curtailment of profits has in no way discouraged the association from appropriating liberally for "encouragement of consumption," an item formerly listed as "propaganda." During the past nitrate year the expenditures for that purpose amounted to approximately $1,000,000.

Chilean production during the nitrate year of 1923-1924 was 22,194,533 metric quintals. This is an increase of 7,198,320 quintals over the preceding year. Stocks amounted to 12,498,175 quintals on June 30.

Japan Match Factory Taken Over by Outside Interests

The *Osaka Asahi* reports that the International Match Corporation has secured practical control of the Japan Match Co. It is said that the management of all amorphous phosphorus factories have been taken over for a period of from 5 to 10 years, which has enabled the corporation to limit output and increase prices.

The Mitsui Bussan Kaisha, which holds a large interest in the Japan Match Co., is said to have arranged the consolidation with the idea that the entire supply of amorphous phosphorus could be controlled. Mr. Takikawa, president of the Kobe Chamber of Commerce, in commenting upon this control by the International Match Corporation, remarks that the output has dropped from 900,000 cases in 1918-1919 to approximately 500,000 cases. There were in 1919 about two hundred factories, but high wages, shortage of material and competition have reduced the number to about seventy. This consolidation may be the means of saving the match industry of Japan.

Tanning Research Laboratory at Cincinnati

Outstanding among the activities which marked the annual meeting of the Tanners Council of America at Cincinnati, Nov. 18 to 20, was the dedication of the council's new research laboratory. Here the studies of the fundamentals of leather manufacture that have been made by Prof. G. D. McLaughlin will be continued and extended. Professor McLaughlin, as director of the laboratory, assisted by E. R. Theis, in charge of chemical work; Dr. G. E. Rockwell, in charge of bacteriological work, and Daisy M. Baehr, histologist.

The laboratory is on the grounds of the University of Cincinnati and the funds for its establishment, approximately $110,000, were raised by Tanners Council. On Wednesday, Nov. 19, the members of Tanners Council and the American Leather Chemists Association were welcomed by Dr. Frederick C. Hicks, president, University of Cincinnati. In the absence of Secretary Hoover, Dr. Martin H. Fischer spoke on the tremendous significance of this undertaking. He was followed by Dr. J. S. Rogers, president American Leather Chemists Association. President Fraser M. Moffat of Tanners Council then presented the laboratory to the University of Cincinnati and it was accepted on behalf of the directors by President Hicks.

In the three-story brick building there are laboratories well equipped for fundamental research on all phases of leather. The large staff laboratories are supplemented by smaller ones for students who have qualified themselves to do special work. The whole undertaking is a splendid example of co-operative fundamental research fostered by an industrial association.

Use of Industrial Alcohol to Be Encouraged in France

A decree of the French Minister of Finance of Oct. 24 establishes a commission for the study of the means that will serve to intensify the use of industrial alcohol in trade and the arts. Government officials and those directly representing various industries are to make up this committee, among the latter a delegate from alcohol producers, agricultural distillers, growers of sugar beets, manufacturers of yeast, wine growers and those who produce cider and fruit sirups. Added to these are delegates from the perfumery and soap industries and those of the automobile industry who may be disposed to help in the research work necessary to develop alcohol as a motor fuel.

New Jersey Reports on Tetra-Ethyl Lead

Labor Department Holds It Impossible to Protect Workmen in Process Used at Bayway

Declaring that it was practically impossible to safeguard workmen from the effects of poisonous contact with tetra-ethyl lead during its manufacture by the process used at Bayway, N. J., Dr. Andrew F. McBride, Commissioner of Labor, protested to Governor Silzer of New Jersey against the resumption of production under present methods. The report points out, however, that the Standard Oil Co. had voluntarily decided to discontinue manufacturing tetra-ethyl lead by the process that had proved fatal to five of its employees and more or less seriously affected thirty others.

Although the company had observed all of the precautions required by the New Jersey laws as regards ventilation and sanitation, Dr. McBride pointed out that the process involved a number of hazardous operations in which the workmen might have come into physical contact with the poisonous substance. He emphasizes the fact that in several reactions pipe joints had to be made and broken repeatedly, thus permitting the workmen to come in contact with the lead compound. "The steam distillation process," according to the report, "seemed to involve unusual risks of a character that would be difficult to guard against except by the most careful use of protective clothing and habits of strictest personal cleanliness on the part of the ordinary workman."

Also Inspects du Pont's

The report also contains a statement of conditions found at the plant of E. I. du Pont de Nemours & Co. at Carney's Point, N. J., where the handling of tetra-ethyl lead was thoroughly inspected. Detailing the processes at the du Pont plant, where all apparatus is stationary and surrounded by every possible safety device, the report says that, with the other precautions taken, tetra-ethyl lead evidently can be manufactured with comparative safety. It is added, however, that there should be no let-up at any time in the precautions.

It is also understood that, according to recent plans of the manufacturers, the hazard of handling the concentrated tetra-ethyl lead at garages and service stations is to be largely eliminated by selling this material only in the form of the greatly diluted ethyl gasoline.

Canada's Gas Output Increasing

Official figures just issued by the Dominion Bureau of Statistics show that for the whole of Canada more than 14,000,000 cu.ft. of gas was produced in 1923. The value of this was $5,875,150, which, in comparison with the figures for 1910, shows a gain of $4,500,000. While Ontario was the largest producer in 1923, the Province of Alberta has shown the most marked development.

Men You Should Know About

FRANK G. ALLEN, chairman of the board of directors of the Armour Leather Co. and president of the Winslow Brothers & Smith Co., Boston, leather tanners, was elected Lieutenant-Governor of Massachusetts at the recent general election. Mr. Allen has been president of the State Senate from 1921 until the present time.

C. E. BALES has been made assistant manager in charge of production at the Louisville Fire Brick Works, Louisville, Ky.

Dr. ROBERT CALVERT, who recently resigned as director of research for the Celite Co., Lompoc, Calif., is now in Washington, D. C.

Dr. H. O. CALVERY and Dr. H. JENSEN have joined the staff of the department of chemistry at the University of Louisville, Louisville, Ky.

S. G. CHIQUELIN, a sugar expert of New Orleans, La., has sailed for Colombia, South America, where he will be in charge of operations at the mill of the Colombia Sugar Co. during the coming season.

A. M. DUPERU, plant manager for the California & Hawaiian Sugar Refining Corporation, Crockett, Calif., has left for a short trip to the Hawaiian Islands.

Dr. WALDEMAR DYRSSEN has been appointed chief engineer of the furnace equipment department and the forge and hammer welding department of the Blaw-Knox Co., Blawknox, Pa.

TYLER FUWA, formerly of the Research Laboratory of Applied Chemistry, Massachusetts Institute of Technology, announces that he has obtained a court decree permitting him to change his name to Chaplin Tyler. Mr. Tyler will join *Chem. & Met.'s* editorial staff, Dec. 1, 1924, and may be addressed in care of this organization.

Dr. J. H. HILDEBRAND, one of the two professors at the University of California chosen to give research lectures this semester, spoke on 'The Stability of Chemical Compounds at Berkeley on Nov. 18.

JOHN INGMANSON has discontinued his connection with the United States Foil Co., Louisville, Ky., and has relocated in Chicago.

W. S. JAMES has become connected with the Associated Oil Co., San Francisco, Calif., as assistant technologist. He was formerly research engineer for the Hupp Motor Car Co., Detroit, Mich.

Dr. LAUDER JONES, of Princeton University, gave an interesting and instructive address before the members of the Delaware Section of the American Chemical Society, Hotel duPont, Wilmington, Nov. 19, on the subject "The Rôle of Nitrogen in Inorganic and Organic Molecules."

W. M. KUNTZ, formerly assistant general superintendent of the Atlas Portland Cement Co., Northampton, Pa., has been appointed general superintendent in charge of operations of the mills of the Mauser Milling Co., Treichlers, Pa. Mr. Kuntz is a graduate of Cornell University and at one time acted as superintendent for the Bethlehem Steel Co.

F. M. MOFFAT, of New York, was re-elected president of the Tanners Council of America at the annual meeting of the organization, held in Cincinnati, Ohio, Nov. 20.

F. J. RUEPING, president of the Fred Rueping Leather Co., Fond du Lac, Wis., is absent on a business trip to Europe, where he is expected to remain for a number of weeks.

Dr. SAMUEL W. STRATTON, president of the Massachusetts Institute of Technology, Cambridge, Mass., has gone to Washington, D. C., where he will undergo an operation at an early date. He is expected to be absent from the university for about 6 weeks.

EDWARD M. WALSH, who received his B.S. degree from the University of Louisville in June of this year, has been employed in the ceramic laboratory of the Louisville Fire Brick Works, Louisville, Ky.

E. WARD TILLOTSON, of Mellon Institute, Pittsburgh, Pa., has been nominated for president of the American Ceramic Society for the coming year.

Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Smithsonian Institution, Washington, D. C., Dec. 29 to Jan. 3.

AMERICAN ASSOCIATION TEXTILE CHEMISTS AND COLORISTS, Bellevue-Stratford, Philadelphia, Dec. 6.

AMERICAN ELECTROCHEMICAL SOCIETY, Niagara Falls, April 23 to 25, 1925.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Hotel Shenley, Pittsburgh, Pa., Dec. 3 to 6.

AMERICAN MANAGEMENT ASSOCIATION, New York, Dec. 11 and 12.

AMERICAN PETROLEUM INSTITUTE, annual meeting, Fort Worth, Tex., Dec. 9, 10 and 11.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Niagara Falls, N. Y., June 4 to 6, 1925.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, Dec. 1 to 4.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, New York, Dec. 1 to 3.

AMERICAN SOCIETY FOR TESTING MATERIALS, twenty-eighth annual meeting, Atlantic City, N. J., June 22 to 26, 1925.

CANADIAN NATIONAL CLAY PRODUCTS ASSOCIATION, twenty-third annual convention, Prince George Hotel, Toronto, Canada, Jan. 20 to 22, 1925.

CANADIAN PULP AND PAPER ASSOCIATION, Montreal, Jan. 28 to 30, 1925.

INSECTICIDE AND DISINFECTANT ASSOCIATION, eleventh annual meeting, New York, Dec. 15 and 16.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 1 to 4.

NEW JERSEY CLAY WORKERS, New Brunswick, N. J., Dec. 19.

SOCIETY OF CHEMICAL INDUSTRY, presentation of Grasselli medal, New York, Dec. 5.

SOUTHERN EXPOSITION, Grand Central Palace, New York, Jan. 19 to 31, 1925.

GEORGE H. WARING, consulting engineer, of Grand Rapids, Mich., and formerly president of the Michigan Gas Association, has recently been elected chairman of the technical section of the American Gas Association.

Obituary

OLAI BACHE-WIIG, first vice-president and general manager of the Wausau Sulphate Fibre Co., Mosinee, Wis., died at Louisville, Ky., recently, following a fall from a horse.

Dr. ALFRED HULSE BROOKS, chief of the Alaskan Division of the U. S. Geological Survey, suffered a stroke of apoplexy at his desk, Nov. 21, and died at the Emergency Hospital in Washington the following day. He had been in poor health for more than a year. Dr. Brooks had been in charge of the surveys of the Alaskan division for 20 years. During the war he served as a Lieutenant-Colonel of Engineers. By the application of his geological knowledge, it was possible for the Allies to construct their trench systems in the best available places. Colonel Brooks was born in Ann Arbor, Mich., July 18, 1871, and was graduated from Harvard in 1894.

A. A. HUCK, superintendent of the Belleville plant of the Canada Cement Co., died recently in Belleville, Ont.

FRANK J. MRAVLA, treasurer of the A-B Glass Works, Inc., Cicero, Ill., died Nov. 16, as the result of an accident.

OTTO W. WILL of Perth Amboy, N. J., superintendent of the ceramic color department at the local works of the Roessler & Hasslacher Chemical Co., died Oct. 30, following an operation for acute appendicitis. He was born at Braubach on the Rhein, Germany, in 1868, and came to this country in 1888. He is survived by his wife, four sons and two brothers.

E. J. WINTER died Sunday, Nov. 23, at Stamford, Conn. He had been in the hospital only a few days. Death was due to an infection in a tooth.

Whale Oil Factory Operates in Spanish Waters

Whaling and the preparation of whale products are not confined to the waters of the polar regions, a report from the consul at Vigo, Spain, reveals. In every report to the Department of Commerce he tells of an active enterprise of this character in the Bay of Vigo in Spain. Specially designed steam whalers operate in a radius of 100 miles from Vigo. In the bay is a large "factory" ship to which the whales are towed when they have fallen victim to the heavy bomb-harpoons which are shot from guns. The factory ship has a complete installation for reducing quickly the blubber, meat and bones. Its output is finished oil and fertilizer. A specially equipped laboratory is maintained on board, where the oil is carefully tested and graded.

Contract Orders Featured Trading in November

Consumers of Chemicals Placed Orders for 1925 Delivery—Higher Average for Prices

Marked gains were reported last month in operations of textile plants. This was shown in the reopening of plants that had been closed and in a closer approximation to capacity production of plants that had been operating on part-time schedules. Other industries that normally consume large quantities of chemicals had enlarged their activities and demand for raw materials reflected this improvement.

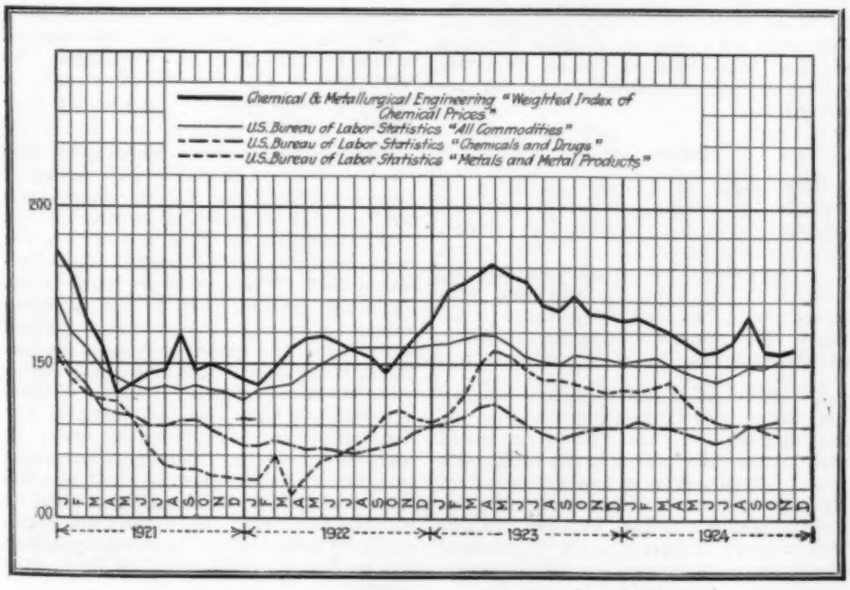
While demand for chemicals for spot and prompt deliveries were more numerous and involved larger quantities, the feature to the market in November was found in the large contracting movement for deliveries over all of next year. About the middle of the month producers of alkalis announced that they were ready to accept new contract orders, and buyers responded so readily that a large tonnage was said to have been booked before the end of the month. Bleaching powder and liquid chlorine also sold freely on contract and the same was true of many acids, bichromates, dry colors, pigments, etc.

The weighted index number for November shows an average of 155.18. This compares with 154.30 for October and 166 for November, 1923. The advance in the average number for the month was due partly to higher markets for some of allied products, such as cottonseed and linseed oils, but in the main it is fairly descriptive of the price trend for chemicals. The metal markets were higher last month and brought about upward revisions in quotations for metal salts. Imported chemicals for the most part were firmer at primary points and consequently were bringing higher prices in domestic markets. Some of the basic heavy chemicals did not change in price, but were reported to be in a steady position. In a few instances competitive selling caused some weakness in selling prices for chemicals, but the market as a whole was steady to strong, with advances more probable than declines.

In its report for the month of October the Bureau of Labor states that a sharp upturn in the general level of wholesale prices was shown for that month. The bureau's weighted index number, which is computed from 404 price series, rose to 151.9, as compared with 148.8 in September. The index number for chemicals and drugs was 132.2 in October and 130.6 in September, while metals and metal products declined from 128.2 in September to 127.2 in October.

Import and export trade in November was on a large scale, according to trade report. Latest official figures refer to September. During that month imports of chemicals showed an increase in value over the totals for the preceding month. Export statistics, however, indicated a falling off in the outward movement of chemicals. Imports of dyes in October were announced as showing an increase of 259 per cent over those for September. This large increase is accounted for by the fact that a lower rate of duty went into effect late in September and importers held back shipments in order to obtain the benefit of the lower imposts.

Among tariff developments of the month was the granting of permission to importers to intervene in the nitrite of soda case. It is expected that this case will be made a basis for a decision on the constitutionality of the flexible provisions of the tariff law. Precedent also was established for the transfer of duty from the basis of foreign market value to American selling price, when the President issued a proclamation that duty on imports of diethylbarbituric acid and salts and compounds thereof should be assessed on American sales prices.



Synthetic Organic Chemical Manufacturers to Meet

The annual meeting of the Synthetic Organic Chemical Manufacturers Association of the United States will be held at the Hotel Commodore, New York City, on Friday, Dec. 12. The sessions will begin at 11:30 a.m.

Trade Notes

The P. T. Chemical Co. of New York City has been incorporated at Albany with an authorized capitalization of $20,000. Incorporators are O. Weil, M. Weil and J. Gensler.

H. D. Ruhm is expected to return to New York this week. He has been visiting his properties in the South. In a recent issue we inadvertently stated that he had organized a small holding corporation at Mt. Pleasant, Tenn., to be known as the Ruhm Phosphate & Chemical Co. The latter company has been in existence for several years and is a direct successor of the Ruhm Phosphate Mining Co., which has been a prominent factor in the phosphate business for nearly 30 years.

T. W. Connor has been elected chairman of the board of directors of the Ditzler Color Co., Detroit, Mich. E. R. Hoag has been elected president and general manager; William T. Utley, vice-president and treasurer; and Kirke W. Connor, secretary and director of sales. L. E. DuBey has been appointed factory manager.

The Dow Chemical Co., Midland, Mich., is sinking a new well in the Riverdale district for brine to be used for the production of chlorides, bromides and kindred specialties.

Trade Commissioner Daniel J. Reagan has sent a report from Paris, which states that the production of alcohol in France during the season 1923-24 was 1,687,797 hectoliters, compared with 1,785,357 hectoliters in 1922-23. The stocks at the end of the season 1923-24 had decreased to 432,966 hectoliters, from 916,105 hectoliters.

A report from France says that in order to provide funds for additional plant capacity for a subsidiary the Société Chimique des Usines du Rhone has increased its capital stock to 30,000,000 francs.

Meeting of Taylor Society in New York This Week

The Taylor Society will meet in New York City on Thursday, Friday and Saturday of this week in the Engineering Societies Building, 29 West 39th St.

Papers will be read and discussion will be led at each day's session by men prominent in industry, among them Morris Llewellyn Cooke, consulting engineer, Philadelphia; Sanford E. Thompson, Thompson & Lichtner Co., Boston; Joseph W. Roe, professor of industrial engineering, College of Engineering, New York University; John G. Callan, Harvard University; Walter Rautenstrauch, Columbia University; Henry S. Dennison, president Dennison Manufacturing Co., Framingham, Mass.; John H. Williams, consulting engineer, New York; Elton Mayo, industrial research department, Wharton School, University of Pennsylvania; Arthur Livingston, manager of research, McKinney, Marsh & Cushing, Detroit, Mich., and Paul T. Cherington, director of research, J. Walter Thompson Co., New York.

Market Conditions

Contract Orders Continue to Reach the Market for Chemicals

Spot Trading Less Active Last Week—Contract Withdrawals Are Supplying the Bulk of Consuming Requirements

CONFIDENCE in prevailing values for chemicals is shown in reports that contract orders were again in evidence last week. It is stated that consumers of some of the basic chemicals are now largely covered for next year. With production well sold ahead the tone to values is strong and it is regarded as probable that values will appreciate before the end of the year. Dealers also report that buyers of smaller lots have shown a readiness to cover ahead and a good volume of business has been done on jobbing account.

Interest in spot goods was less pronounced last week and many sellers described the market as quiet. There was no pressure, however, on the part of sellers and the general improvement in business circles is expected to bring about a more regular call for prompt shipments.

The weighted index number for the period was 155.70. In the preceding week the number stood at 156. The decline resulted from lower prices for linseed oil and other allied products. The chemical list showed no price weakness, as most selections were steady at former levels and in a few cases advances were registered over the prices ruling in the preceding week. The weighted number for the corresponding week a year ago was 164.98, which signifies a lowering of more than 5 per cent in the average price during the year.

Imported chemicals were firmly held and advices from abroad would indicate a continuance of this condition. Importers of prussiate of soda reported advances at primary centers and they marked up spot holdings accordingly. Permanganate of potash also was in a strong position and this was true of the other potash salts.

The long drawn out controversy over import duties on cresylic acid were settled by a decision handed down by the Customs Court of Appeals. The decision made this material dutiable at 40 per cent ad valorem and 7c. per lb. Interest also was aroused by a report from Chile that producers of nitrate of soda were disturbed over competition from synthetic products and were urging a reduction in the export tax of Chile, in order to be enabled to sell at lower prices in consuming markets.

Acids

Very favorable reports regarding consumption are coming from producers of sulphuric acid. Premiums are being obtained on shipments in small lots and tank car lots are finding a good outlet at steady prices. Producers also have found a good contract business and are carrying many orders for 1925 delivery. Conditions of normalcy are reported for nitric acid with a good call for supplies and no burdensome stocks at producing points. Muriatic acid also is steady both in movement and in price. Citric and tartaric acids are not active, but forward positions are expected to come in for considerable attention before long. Acetic acid has been quoted at unchanged levels for some time, but the quotations are being lived up to more commonly than was the case in previous months. Formic acid has been of interest because of activity by sellers and the low price quoted for the imported material has influenced buyers to place orders. Oxalic acid has not improved its position largely because of the readiness of some domestic sellers to offer competition to the imported acid.

Arsenic Weakens Under Lack of Demand — Prussiate of Soda Firmer—Good Demand for Caustic Soda—Caustic Potash in Strong Position—Tin Oxide Marked Up 2c. Per Lb. — Permanganate of Potash Holds Recent Advance — Sal Ammoniac Unchanged — Carbonate of Potash Steadier—Sulphuric Acid Moves Freely

Potashes

Bichromate of Potash—In spite of reports that some producers are not satisfied with the current low prices, the market preserves an easy tone. It is reported that small lots can be bought at 8½c. per lb. and that this figure could be shaded on large business. The open quotation is 8½@8¾c. per lb., according to seller and quantity.

Carbonate of Potash—Recent buying has taken considerable quantities off the market and this fact, combined with rumors that foreign markets were slated for an advance, has given a firm tone to values. Calcined 80-85 per cent is quoted at 5½c. per lb. and 96-98 per cent at 5¾c. per lb. Hydrated 80-85 per cent is said to be in ample supply and is quoted at 5c. per lb.

Caustic Potash—Imported caustic appeared firmer. Inquiries for goods ex-warehouse brought out quotations of 7¼c. per lb. and bids under that figure were said to have gone unaccepted. Arrivals during the week were offered at 7¼c. per lb. ex-dock and this was said to be a firm quotation. Shipments from abroad were still quoted at 7¼c. per lb. Domestic caustic held at 7½c. per lb., and upward, at works.

Permanganate of Potash—Recent advances in price have been sustained. The lowest price heard for imported permanganate was 14c. per lb. and this was not a general quotation, as some sellers were holding out for 15c. per lb. Sellers of domestic permanganate were asking 15c. per lb.

Prussiate of Potash—Demand has been quiet and there was no change in the market during the week. Red prussiate was quoted at 37c. per lb. with the possibility that this figure could be shaded. Yellow prussiate also was quiet with spot holdings at 16½c. per lb. and shipments at 16c. per lb.

Sodas

Acetate of Soda—Sales of moderate sized lots are reported at 5@5½c. per lb. The carlot quotation generally is given as 5c. per lb. but it is possible that this can be shaded in some quarters. New business was reported to be light during the week but there is a good call for deliveries against contracts.

Bichromate of Soda—Some speculation is heard regarding the amount of bichromate sold for 1925 delivery. It is generally held that contract business has exceeded that of a year ago. Fair inquiry is reported in the present market with no real change in the situation. It is evident that some producers are eager to sell and those who have been unwilling to compete have not secured a fair percentage of the business. The quotation is given at 6½@6¾c. per lb. with the tone easy and quotations subject to some shading.

Caustic Soda—The feature to this market is found in the large amount of contract business which has been written. It is stated that most large consumers lost no time in covering for next year and smaller buyers have followed suit. Producers are now in an excellent position and if new business comes to hand in the volume expected as a result of larger industrial operations, it is highly probable that values will work to higher levels. Export demand has been fair and there is less disposition to cut prices in order to attract exporters. The contract price for the domestic trade is $3.10 per 100 lb. for solid 76 per cent in carlots at works. Quotations for export are given at $3.10 per 100 lb. in some quarters but as low as $2.90 per 100 lb. is still heard.

Chlorate of Soda—No great activity is noted for this material. Imported chlorate is offered on spot at 6@6¼c. per lb. and shipments are to be had at 6c. per lb. Domestic chlorate is moving normally with asking prices at 6¼c. per lb. and upward at works.

Nitrite of Soda—Domestic nitrite is not plentiful and some producers are said to be behind with contract deliveries. Imported nitrite also is in limited supply and the market is reported as firm. The inside price for spot material is 9¼c. per lb., with small lots bringing 9½c. per lb.

Prussiate of Soda—Cables received during the week quoted higher prices for shipment and 9c. per lb. was asked by importers. Spot prussiate also was firmer and holders were asking 9¼c. per lb. It is said that considerable quantities have been contracted for in recent weeks at 8¾c. per lb.

Miscellaneous Chemicals

Arsenic—Buying interest has been dull and sellers have offered inducements without results. Insecticide manufacturers are slow to take hold because they are not finding much inquiry for calcium arsenate and reports that large stocks of arsenic and arsenate are held in this country have a depressing influence on trading. Offerings of Japanese arsenic for shipment were heard as low as 5¾c. per lb. and European at 6c. per lb. Domestic arsenic was held at 6½@6¾c. per lb.

Copper Sulphate — While the metal market was strong the attempt to hold up prices for foreign-made sulphate was not successful and in some quarters quotations of 4.42½c. per lb. were put out for prompt shipment from abroad. The range on imported was 4.42½c. to 4.50c. per lb. Domestic sulphate was unchanged at 4½ to 4¾c. per lb., according to seller and make.

Ether—Leading producers have announced an advance of 2c. per lb. The revised quotations are 15c. per lb. for U. S. P., 18c. per lb. for anaesthetic, and 23c. per lb. for motor.

Formaldehyde—Sellers are making a differential in price according to quantity and less than carlots are quoted at 9½@9¾c. per lb. For carlots the market is firm at 9c. per lb. and there have been rumors that higher prices were to follow.

Sal Ammoniac—In spite of the fact that many consumers are covered ahead, there has been fair inquiry for this chemical. Imported white sal ammoniac is held at 6@6¼c. per lb. on spot with shipments at 5¾c. per lb. Domestic sal ammoniac is quoted at 7@7¼c. per lb. and has been selling in a normal way. Domestic gray is held at 8@8¼c. per lb. and imported gray at 7¼@7½c. per lb.

Sulphate of Ammonia—Contract deliveries are absorbing stocks about as fast as produced and surplus stocks are too small to admit of much spot trading. Production is reported to be increasing. Export inquiry is heard at intervals, but there is very little business of that nature and f.a.s. quotations are purely nominal. The quotation for the domestic trade is $2.70@$2.80 per 100 lb. in bulk, at works.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	155.70
Last week	156.00
Dec., 1923	165.00
Dec., 1922	164.00
Dec., 1921	145.00
Dec., 1920	189.00
Dec., 1919	245.00
Dec., 1918	277.00

Major items in the chemical market were quotably unchanged. The slight decline in the index number was occasioned by the reaction in linseed oil.

Tin Oxide — Very good buying interest has continued in the metal market and all the tin salts are in a strong position. It is expected that higher selling prices will prevail for most of these selections for December delivery. Early in the week, producers put out a higher quotation for tin oxide and changed the asking price from 56c. per lb. to 58c. per lb.

Alcohol

There was a strong market for denatured alcohol but first hands did not alter the selling schedule. Offerings of spot material were scanty and some dealers have experienced no difficulty in selling goods at a premium. The active demand again came from the automobile field, the call for anti-freezing compounds being brisk. Formula No. 1, special denatured, 190 proof, was offered by producers at 55@55½c. per gal., in drums, carload lots, nearby delivery.

Demand for methanol was quiet with no change in the general situation. The undertone of the market was just about steady. Quotations were repeated on the basis of 76c. per gal. for the 97 per cent grade, in bbl., carload lots. Pure methanol, in tank cars, held at 76c. per gal., works.

Coal-Tar Products

Crudes Steady on Small Stocks—Refined Naphthalene for 1925 Delivery Firm—Good Inquiry for Pyridine

TRADING in coal-tar products met with a slight setback last week, yet sentiment favored sellers and prices generally were well maintained. In crudes the stocks remain small, the recent gain in coke oven operations apparently being discounted by the larger seasonal withdrawals by consuming industries. Competition for business in the division for intermediates was quite keen and this acted as a check to any upward tendency of prices. The decision by the Court of Customs Appeals holding that cresylic acid is dutiable under paragraph 27 of the tariff act of 1922 had no influence upon trading in this commodity, as importers had a clear understanding of the situation. Nearly all of the crude cresylic acid imported in recent months has been sufficiently low in quality to come under the classification providing for the free entry of coal-tar distillates. Leading producers of refined naphthalene entertained rather firm views on forward business, which imparted a better tone to the spot market on both flake and ball. Pyridine was in good demand and slightly firmer prices were named for spot material by some traders.

Aniline Oil and Salt—There was a fair call for aniline oil and the market, while quotably unchanged, was firm. Business was placed on the carload basis of 16c. per lb., in drums, f.o.b. works. Aniline oil for red was nominal at 40c. per lb. Aniline salt was inactive, with prices ranging from 20@22c. per lb.

Beta-naphthol—Producers were firm in their ideas, but the market closed the week unchanged at 24@25c. per lb., the inside figure obtaining on round lots.

Benzene—With stocks below normal first hands reported the market as firm, especially on nearby material. There has been some improvement in production, but the gain hardly has been sufficient to bring out any real change in the supply situation. Quotations were repeated at 23c. per gal. for the 90 per cent grade, and 25c. per gal for the pure, tank cars, f.o.b. works.

Creosote—Arrivals from abroad have been larger. Advices from English markets report a fair amount of buying interest from America, but competition for export business with the Continent tends to hold prices down. Manchester quotes 5½d. per gal., loose, f.o.b. works.

Cresylic Acid—Domestic makers have been sellers around 59c. per gal., carload basis, works, on the 97 per cent grade. The spot market held at 62@66c. per gal., in drums, according to quantity and seller.

Diethylaniline—There was a firmer market for this intermediate, prices advancing to 60@63c. per lb.

Naphthalene — Traders in refined naphthalene feel more optimistic over the situation. Surplus stocks have been reduced in nearly all directions and, with leading factors apparently firm in their ideas on 1925 business, there has been a gradual hardening of prices for spot material. Refined flake settled nominally at 5@5½c. per lb., leading makers asking the top figure. Ball naphthalene held at 6½c. per lb. Chipped material of good quality held at 4½c. per lb. Crude, to import, was steady at 2c. per lb., c.i.f. New York.

Phenol — The market closed unchanged at 24@25c. per lb., in drums, There was a firm undertone, producers showing no disposition to shade the market on futures.

Pyridine—Spot material was in good request and the market was steady to firm at $4@$4.15 per gal., in drums. Manchester quotes pyridine for immediate shipment at 19s. per gal.

Toluene—Market inactive, but production restricted to actual needs of trade and prices are steady on the tank car basis of 26c. per gal., f.o.b. works.

Vegetable Oils and Fats

Refined Cottonseed Oil Slightly Higher—Linseed Lower—Coconut Advances—China Wood Unsettled—Tallow Firm

THE market for oils and fats revealed no definite price tendency in the past week, but changes were few and rather unimportant. In the main the undertone was steady. Trading was moderate, with many consumers inclined to hold off for a reaction from the recent general advance in prices. A feature during the week was the steadiness in Ceylon type coconut oil for nearby delivery. China wood oil was offered more freely and at slightly lower levels. Linseed oil was dull and competition brought out easier prices. Crude corn oil sold at an advance in the Middle West. Refined cottonseed oil was a shade higher in all positions. Tallow sold at unchanged prices.

Cottonseed Oil — Sentiment in the New York market for refined cottonseed oil was mostly bearish, based on the prospects for a much larger supply of oil from the 1924 crop of cotton. But prices held comparatively steady, scoring slight gains for the week. With cottonseed oil the cheapest material of its class now available in the world's market efforts to depress prices have come to nothing. Refiners operated on both sides of the market, but selling orders predominated. Export inquiry again was in evidence. During the past week approximately 8,000 bbl. of refined cottonseed oil were shipped abroad from this port. Domestic business in oil and lard compound in November was good. Prime summer yellow oil for December settled at 10.86@10.90c. per lb., in bbl., with January at 10.77@10.79c. per lb., and May at 11.03@11.04c. per lb. Crude oil was less active, but steady, selling at 9c. per lb., tank cars, f.o.b. mills, Southeast and Valley. In Texas 8¼c. was asked, tank car basis. Bleachable oil was offered at 9¼c. per lb., tank cars, f.o.b. Texas common points. Lard compound in New York held at 13c. per lb., carload basis. Pure lard in the Chicago market settled with cash at 14.45c. per lb., against 14.50c. a week ago. In spite of the liberal receipts of hogs the production of lard continues light. The average weight of hogs is below normal.

Linseed Oil—With trading inactive, and no important change in the position of seed, crushers appeared more anxious for business and the increased offerings brought out a moderate decline in prices. Spot oil was offered at $1.07 per gal., in bbl., carload lots, with January-March at $1.05 per gal., and April forward at $1.06 per gal. Compared with a week ago prices went off from 1@3c. per gal., depending upon delivery. Crop news from the Argentine was more favorable and, with buyers of seed holding off, the market eased off. Buenos Aires offered December shipment seed in the option market at $2.18¼, which compares with $2.28¼ a week ago. Private estimates on the Argentine exportable surplus for next year covered a wide range, and because of the uncertainty regarding the supply traders were inclined to hold off awaiting further developments. The domestic markets for seed were steady, closing practically unchanged for the week. Duluth quoted December seed at $2.64, and May seed at $2.72 per bu. Receipts of domestic seed at the principal Northwestern terminals since the beginning of the crop year amounted to 20,500,000 bu., strengthening the opinion that the total crop may come close to 30,000,000 bu. Stocks of seed at Minneapolis on Nov. 22 amounted to 224,870 bu., which compares with 750,619 bu. on the corresponding date a year ago. Duluth stocks are heavy, but a good part of the holdings will be shipped to points in the East. Crushers were active buyers of domestic seed throughout the week. The cake market was quiet and lower, settling at $47 per ton, f.a.s. New York.

Argentine Flaxseed Exports to United States Smaller

Shipments of flaxseed from the Argentine to the United States have been smaller, the total since the beginning of 1924 amounting to 14,243,000 bu., as against 20,876,000 bu. for the corresponding period a year ago. The smaller shipments to this country were offset by a much larger domestic production, the latest official estimate placing the yield in the Northwest at 30,652,000 bu., which compares with 17,429,000 bu., in 1923.

Argentine flaxseed shipments to all countries, from Jan. 1 to Nov. 21, with a comparison, follow:

	1924	1923
United Kingdom, bu.	6,964,000	3,396,000
Continent, bu.	24,098,000	13,192,000
United States, bu.	14,243,000	20,876,000
*To order, bu.	9,478,000	5,284,000
Total	54,783,000	42,748,000

* To U. K. and Europe.

China Wood Oil—Demand was less active and prices eased off. Sales went through at 13½c. per lb., tank cars, Pacific ports, January forward shipment. Later 13⅝c. was asked. In New York nearby oil was offered at 15½c. per lb., cooperage basis.

Corn Oil — Prompt shipment crude sold at 10½c. per lb., tank cars, Chicago, an advance of ¼c. Offerings were scanty because of restricted production.

Coconut Oil—There was a firm market for nearby material. Prompt shipment Ceylon type oil closed at 10c. per lb., tank cars, f.o.b. San Francisco, and at 10¼c. per lb., tank cars, f.o.b. New York. January shipment from here was offered at 10⅜c. per lb. On the Pacific coast January forward sold at 9⅝c. per lb., tank car basis.

Olive Oil Foots—Prime green Italian foots sold on spot at 9¼c. per lb., in bbl.

Palm Oils — Lagos oil for prompt shipment from abroad sold at 9.85c. per lb. Lagos for December forward shipment from Africa was nominal at 9.60c. per lb. Niger oil for shipment from Africa settled at 8.65@8.70c. per lb., with no buyers.

Other Vegetable Oils—Palm kernel oil for shipment from England was offered at 10¼@10⅜c. per lb., in casks. Refined rapeseed oil, English, was firm on the basis of $1@$1.01 per gal., shipment from the other side. Crude domestic peanut oil sold at 12c. per lb., tank cars, f.o.b. mills, Southeast. Crude soya bean oil was traded in at 8.30c. per lb., in bond, bulk basis, c.i.f. Pacific coast ports. Prompt shipment soya, in tank cars, duty paid, sold at 12c. per lb., San Francisco.

Fish Oils—North Carolina crude menhaden oil was offered at 55c. per gal., tank cars, factory. In the Chesapeake Bay district the market for crude was nominal at 58c. per gal., tank cars. Untanked Newfoundland cod oil was offered for shipment at 60c. per gal.

Tallow, Etc.—Extra special tallow, ex melters' plant, sold at 10c. per lb. Yellow grease held at 9c. per lb. Oleo stearine sold at 11¼c. per lb. No. 1 oleo oil sold at 18c. per lb., in bbl.

Miscellaneous Materials

Antimony — With trading slack sellers lowered prices for spot Chinese antimony ⅛c. per lb., the market closing at 14⅜@14⅝c. per lb. Cookson's "C" grade was nominal at 16⅜ @17c. per lb. Chinese needle lump nominal at 10c. per lb. Standard needle powdered, 200 mesh, 11¼c. per lb. White oxide was steady at 13@14c. per lb.

Glycerine — Dynamite sold in the Middle West at 17¼c. per lb., in drums, carload lots, another decline of ¼c. In the New York district the market for dynamite was nominally unchanged at 17⅜c. per lb. Chemically pure glycerine was in steady demand and the market held at 18⅜@19c. per lb., in drums. Soap lye crude, basis 80 per cent, loose, was offered at 11⅜c. per lb., f.o.b. point of shipment. Saponification crude, basis 88 per cent, loose, was offered at 13¼c. per lb.

Naval Stores—Trading in spirits of turpentine was inactive and the market eased off, sales taking place at 84c. per gal., in bbl., a decline of 1c. Rosins, on the other hand, ruled firm on good deliveries against existing contracts and some export inquiry. The lower grades of rosins settled at $7.55@$7.65 per bbl.

White Lead—Corroders have a good volume of business on their books and report the market on all of the lead pigments as satisfactory for this time of the year. The pig lead situation improved somewhat in the past week, more active trading steadying prices. The "official" price for pig lead was 8.65c. per lb. Standard dry white lead, basic carbonate, was quotably unchanged at 10¼c. per lb., in bbl. or casks, carload lots.

Zinc Oxide—A steady market was reported for zinc oxide, but leading makers continued to quote at the old prices. American process, lead free, settled at 7⅜c. per lb. The metal was slightly higher on increased business.

Imports at the Port of New York

November 21 to November 26

ACETIC ANHYDRIDE—48 pkg., Rotterdam, H. A. Metz & Co.

ACETONE OIL—44 dr., Hamburg, R. W. Greeff & Co.

ACIDS—Cresylic—25 cs., Barrow, American-Hawaiian S. S. Co.; 1 pkg., Barrow, Industrial Chemical Co.; 6 dr., Glasgow, Order; 94 dr., Liverpool, Order. **Citric**—40 kegs, Los Angeles, Order. **Formic**—140 demijohns, Rotterdam, R. W. Greeff & Co. **Oxalic**—20 csk., Hamburg, A. Klipstein & Co. **Phenol**—3 bbl., Hamburg, Guaranty Trust Co. **Phosphoric**—88 pkg., Hamburg, Order.

ALBUMEN—33 cs., Shanghai, Stein, Hall & Co.; 47 cs., Shanghai, Habicht, Braun & Co.

ALCOHOL—10 dr. amyl., Hamburg, Irving Bank-Col. Trust Co., 63 bbl. denatured, San Juan, Olivet Distilling Co.; 260 bbl. do., Arecibo, C. Estevas; 230 bbl. and 25 dr. San Juan, C. Estevas; 37 dr. butyl, Rotterdam, H. A. Metz & Co.

AMMONIUM CHLORIDE—5 cs., Liverpool, Wing & Evans.

AMMONIUM OXALATE—10 csk., Antwerp, Order.

ANTIMONY—34 csk., Newcastle, S. Fallwood.

ANTIMONY SULPHIDE—75 csk., Newcastle, S. Fallwood.

ANTIMONY REGULUS—150 cs., Shanghai, I. R. Boody & Co.

BARIUM PEROXIDE—118 kegs, Rotterdam, W. A. Brown & Co.; 30 kegs, Rotterdam, Mallinckrodt Chem. Works.

BLEACHING POWDER—150 cs., Liverpool, Kohnstamm & Co.

BORACITE—1,210 tons, Panderma, Pacific Coast Borax Co.

CALCIUM—1 cs. metallic, Havre, C. Hardy, Inc.; 9 pkg., Hamburg, Pfaltz & Bauer.

CAMPHOR—235 cs., Shanghai, D. L. Moss & Co.; 200 cs., Shanghai, F. A. Cundill & Co.; 30 cs., Hong Kong, Mechanics & Metals Nat'l Bank.

CHALK—400 bg., Antwerp, Billiard Co.; 275 bg., Bristol, H. J. Baker & Bro.; 192 bg., Bristol, Order; 800,000 kilos, Dunkirk, W. G. Higman & Co.; 500,000 kilos. Dunkirk, K. B. Fox; 2621 bg. and 300 bbl., Antwerp, National City Bank; 500 tons, London, Baring Bros. & Co.

CHEMICALS—70 cs., Hamburg, F. E. Wallace & Co.; 274 bg., Glasgow, Brown Bros. & Co.; 178 pkg., Hamburg, Jungmann & Co.; 50 dr., Hamburg, Order; 6 cs., Hamburg, G. & H. Transport Co.; 50 csk., Rotterdam, Roessler & Hasslacher Chem. Co.; 160 cs., Rotterdam, Order; 61 csk., Bremen, Roessler & Hasslacher Chem. Co.; 300 bg., Bremen, Order; 20 csk., Rotterdam, A. Klipstein & Co.; 97 csk., Rotterdam, Hummel & Robinson Corp.; 140 csk., Rotterdam, Roessler & Hasslacher Chem. Co.

CLAY—335 bg. china, Bristol, National City Bank; 133 csk., Bristol, Central Union Trust Co.; 264 tons, Bristol, Papermakers Importing Co.; 595 tons, Bristol, Moore & Munger; 228 tons, Bristol, Order.

COAL-TAR INTERMEDIATES—1 cs., Rotterdam, Kuttroff, Pickhardt & Co.; 1 cs., Rotterdam, Grasselli Dyestuff Corp.

COLORS—24 csk. ultramarine blue, Glasgow, A. Maharrie; 16 pkg., aniline, Genoa, Ackerman Color Co.; 42 csk. earth, Hamburg, Reichard-Coulston, Inc.; 53 pkg. aniline, Havre, Ciba Co.; 78 pkg. do., Havre, Carbic Color & Chemical Co.; 19 dr. do., Havre, Sandz Chemical Works; 42 csk. do., Havre, Geigy Co.; 16 pkg. do., Havre, Sandz Chemical Works; 46 pkg. do., Antwerp, American Exchange National Bank; 7 csk. do., Antwerp, Geigy Co.; 39 pkg. aniline, Rotterdam, Kuttroff, Pickhardt & Co.; 4 csk. do., Rotterdam, Color Service Corp.; 25 pkg. do., Rotterdam, H. A. Metz & Co.; 28 bbl., Liverpool, Irving Bank-Col. Trust Co.; 153 csk. earth, Rotterdam, C. J. Osborn & Co.; 5 csk. aniline, Rotterdam, Equitable Trust Co.; 3 csk. do., Rotterdam, American Exchange National Bank.

COPPER OXIDE—18 csk., Hamburg, Order.

CREOSOTE—5,223 tons (in bulk), Amsterdam, to Jacksonville, Order; 3599 tons, Grangemouth, to port Reading, Order.

CUTCH—1,000 bg., Singapore, Order.

FERROTITANIUM—3 kegs, Liverpool, Order.

FUSEL OIL—2 dr., Hamburg, East River National Bank; 34 dr., Hamburg, Order; 4 bbl., Rotterdam, Order.

GAMBIER—525 cs., Singapore, Order.

GLYCERINE—118 dr., Liverpool, Hercules Powder Co.; 10 dr., crude, Antwerp, Brown Bros. & Co.

GUMS—95 bg. copal, Antwerp, W. H. Scheel & Co.; 1439 bg. do., Antwerp, Order; 50 cs. damar and 53 cs. copal, Singapore, Baring Bros. & Co.; 158 bg. damar, Singapore, W. Brandt's Sons; 254 pkg. damar, Singapore, Order; 126 bg. copal, Manila, Bank of India, Australia & China; 128 bg. damer, Singapore, Brown Bros. & Co.; 552 bg. copal, Antwerp, Chemical National Bank; 612 bg. copal, Antwerp, Order.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

ACETATE OF LIME and methyl alcohol. Stockholm, Sweden. Purchase.—12,315.

BORAX, powdered. Halifax, Canada. Purchase.—12,316.

CHLORIDE OF CALCIUM and chloride of zinc. Goteborg, Sweden. Agency.—12,309.

ANILINE DYES. Bahia, Brazil. Agency.—12,310.

COAL-TAR DYES. Budapest, Hungary. Purchase and agency.—12,312.

PHOSPHORUS, sesquisulphide of. Milan, Italy. Purchase.—12,314.

POTASH, bicarbonate of. Antwerp, Belgium. Purchase.—12,311.

SODA CAUSTIC. Malaga, Spain. Agency.—12,308.

HEXAMETHYLENE—20 cs., Hamburg, Order.

INFUSIORIAL EARTH—1,630 bg., Portland, Order.

IRON CHLORIDE—33 csk., Hamburg, Irving Bank-Col. Trust Co.

IRON OXIDE—13 csk., Liverpool, Reichard-Coulston, Inc.; 77 csk., Liverpool, J. A. McNulty.

LAMPBLACK—200 bbl., Antwerp, National City Bank.

LITHOPONE—1,000 csk., Antwerp, Benjamin Moore & Co.; 151 bbl., Antwerp, E. M. & F. Waldo; 40 bbl., Antwerp, A. Klipstein & Co.; 40 csk., Rotterdam, L. H. Butcher & Co.

MAGNESITE—106 csk. and 250 bg., Rotterdam, Brown Bros. & Co.

MAGNESIUM CHLORIDE—27 dr., Hamburg, A. Klipstein & Co.

MAGNESIUM CARBONATE—67 bg., Newcastle, Order.

MANGROVE BARK—500 bg., Cape Haitien, P. Andrade & Son.

MINERAL WHITE—600 bg., Hull, Hammill & Gillespie.

MYROBALANS—6,315 pkg., Calcutta, National City Bank.

OCHER—273 bbl., Marseilles, American Exchange National Bank; 227 bbl., Marseilles, Reichard-Coulston, Inc.; 88 bbl., Marseilles, Order.

OILS — Coconut—1,894,816 lb., Cebu, Philippine Refining Co.; 921 tons, Cebu, Philippine Refining Co.; 879 tons, Manila, Spencer Kellogg & Sons. **China Wood**—150 csk., Shanghai, Bingham & Co.; 303 csk. Shanghai, Bingham & Co.; 250 bbl., Hong Kong, Order. **Cod**—300 csk., St. Johns, National Oil Products Co.; 100 bbl., St. JJohns, Bowring & Co.; 150 bbl., Aberdeen, Order. **Palm kernel**—152 bbl., Hull, Order. **Palm**—174 csk., Liverpool, Palmolive Co.; 80 csk., Liverpool, Core & Herbert; 202 csk., Liverpool, Guaranty Trust Co.; 39 csk., Liverpool, Rayner & Stonington; 216 csk., Liverpool, Palmolive Co.; 29 csk., Liverpool, J. H. Faunce. **Rapeseed**—50 bbl., Hull, J. D. Irwin; 400 bbl., Hull, Order.

OILSEEDS — Copra—525 bg., Belize, Franklin Baker Co. **Sesame**—100 bg., Smyrna, Order; 500 bg., Shanghai, Wah, Chang Trading Co.

PLUMBAGO—335 pkg., Colombo, Order.

POTASSIUM SALTS—22 cs. alum, Liverpool, United American Lines; 5,000 bg. sulphate, 250 bg. muriate and 2,080 bg. manure, Antwerp, Societe Comm. des Potasses d'Alsace; 1,000 csk. chlorate, Hamburg, Irving Bank-Col. Trust Co.; 50 cs. bromide, Hamburg, A. Hurst & Co.; 52 bbl. hydrate, Hamburg, Brown Bros. & Co.; 527 dr. caustic, Hamburg, A. Klipstein & Co.; 1,500 csk. chlorate, Hamburg, Irving Bank-Col. Trust Co.; 67 bbl. alum, Hamburg, Order; 56 pkg. carbonate, Hamburg, Order; 300 kegs chlorate, Hamburg, Order; 4 bbl. carbonate, Hamburg, McKesson & Robbins; 75 dr. caustic, Hamburg, Parsons & Petit; 30 bg. muriate, Bremen, Potash Importing Corp. of Am.; 250 bbl. chlorate, Havre, C. Hardy, Inc.; 1,000 bg. muriate, Bremen, Potash Importing Corp. of Am.; 20 cs. bromide, London, R. W. Greeff & Co.; 20 cs. do., London, Lo Curto & Funk; 60 csk. perchlorate, Rotterdam, W. F. Eissing.

PYRIDINE—10 dr. Hamburg, Irving Bank-Col. Trust Co.; 6 dr., Hamburg, R. W. Greeff & Co.; 6 dr. Hamburg, Bernard, Judae & Co.; 24 dr., Hamburg, Order.

SAL AMMONIAC—20 csk., Hamburg, J. C. Wiarda & Co.; 244 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 200 csk., Rotterdam, Kuttroff, Pickhard & Co.

SHELLAC—28 cs., Rotterdam, C. F. Gerlach; 100 bg., Calcutta, British Bank; 2,274 bg., Calcutta, Order; 1,350 bg., Calcutta, Order.

SILICEOUS EARTH—406 bg. Antwerp, Chaplain & Bibbo Co.

SODIUM SALTS—22 csk. prussiate, Liverpool, C. Tennant Sons & Co.; 40 cs. bromide, Hamburg; C. B. Richard & Co.; 273 dr. sulphite, Hamburg, C. S. Grant & Co.; 50 cs. bromide, Hamburg, Order; 240 dr. sulphite, Rotterdam, C. S. Grant & Co.; 1 csk. nitrite, Rotterdam, Kuttroff, Pickhardt & Co.; 15 csk. prussiate, Rotterdam, Order; 110 csk. hydrosulphite, Liverpool, Kuttroff, Pickhardt & Co.; 188 cs. cyanide, Liverpool, Order; 11,855 bg. nitrate, Antofogasta, Wessel, Duval & Co.

STARCH—500 bg. potato,Hamburg, Stein, Hall & Co.; 100 bg., Rotterdam, National Gum & Mica Co.

SULPHUR—200 csk., Bordeaux, Heemsoth, Base Co.; 44 csk., Bordeaux, Order.

SUMAC—100 bbl. leaves, Palermo, Guaranty Trust Co.; 280 bg. ground, Palermo, Order.

TARTAR—444 bg., Valencia, Tartar Chemical Co.; 300 bg., Marseilles, Royal Baking Powder Co.; 100 bg. Marseilles, C. Pfizer & Co.

VALONEA—5,156 bg., Smyrna, Order.

WAXES—90 bg. carnauba, Para, Lazard Freres; 74 bg. do., Para, National City Bank; 276 bg. do., Para, J. H. Rossbach & Bros.; 393 bg. do., Para, Order; 56 bg. beeswax, Singapore, Order; 100 cs. spermaceti, Glasgow, Order; 20 bg. crude beeswax, Santiago, R. Desvernine; 8 bg. do., Santiago, Order; 34 bbl. beeswax, Rotterdam, Ponds Extract Co.

WHITING—4,436 bg., Dunkirk, Taintor Trading Co.; 1,200 bg., Havre, S. L. Libby Corp.; 800 bg., Havre, Hammill & Gillespie; 400 bg., Havre, C. B. Chrystal; 500 bg., Antwerp, Reichard-Coulston, Inc.

WOOL GREASE—30 cs., Bremen, Pfaltz & Bauer; 100 bbl., Bremen, W. Schall & Co.

ZINC CHLORIDE—70 csk., Rotterdam, T. Goldschmidt Corp.

ZINC OXIDE—50 bbl., Marseilles, Whittaker, Clark & Daniels; 50 bbl., Marseilles, American Exchange National Bank; 150 bbl., Marseilles, Order.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are first-hand quotations in the New York market for industrial chemicals, coal-tar products and related materials used in the industries that produce

Dyes	**Paper and Pulp**
Paint and Varnish	**Petroleum**
Ceramic Materials	**Soap**
Fertilizers	**Explosives**
Rubber	**Food Products**
Sugar	**Metal Products**

Whenever available these prices are those of the American manufacturer. If for material f.o.b. works or on a contract basis, quotations are so designated. All prices refer to large quantities in original packages.

Industrial Chemicals

Acetone, drums, works	lb.	$0.15 –	$0.16
Acetic anhydride, 85 %, dr	lb.	.34 –	.36
Acid, acetic, 28%, bbl	100 lb.	3.12 –	3.37
Acetic, 56%, bbl	100 lb.	5.85 –	6.10
Acetic, 80%, bbl	100 lb.	8.19 –	8.44
Glacial, 99½%, bbl	100 lb.	11.01 –	11.51
Boric, bbl	lb.	.09 –	.09½
Citric, kegs	lb.	.45½ –	.46½
Formic, 85%	lb.	.11 –	.11½
Gallic, tech	lb.	.45½ –	.47
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl	lb.	.12½ –	.13
22% tech., light, bbl	lb.	.06 –	.06½
Muriatic, 18° tanks	100 lb.	.80 –	.85
Muriatic, 20°, tanks	100 lb.	.95 –	1.00
Nitric, 36°, carboys	lb.	.04 –	.04½
Nitric, 42°, carboys	lb.	.04½ –	.05¼
Oleum, 20%, tanks	ton	16.00 –	17.00
Oxalic, crystals, bbl	lb.	.09½ –	.09¾
Phosphoric, 50% carboys	lb.	.07½ –	.07¾
Pyrogallic, resublimed	lb.	1.55 –	1.60
Sulphuric, 60°, tanks	ton	8.00 –	9.00
Sulphuric, 60°, drums	ton	12.00 –	13.00
Sulphuric, 66°, tanks	ton	13.00 –	14.00
Sulphuric, 66°, drums	ton	17.00 –	18.00
Tannic, U.S.P., bbl	lb.	.65 –	.70
Tannic, tech., bbl	lb.	.45 –	.50
Tartaric, imp., powd., bbl	lb.	.26½ –	.27
Tartaric, domestic, bbl	lb.	.29 –	.30
Tungstic, per lb	lb.	1.20 –	1.25
Alcohol, butyl, drums, wks	lb.	.28 –	.30
Ethyl, 190 p'f. U.S.P., bbl	gal.	4.89 –	.....
Denatured, 190 proof No. 1, special bbl	gal.	.61 –	.....
No. 1, 190 proof, special, dr	gal.	.55 –	.....
No. 1, 188 proof, bbl	gal.	.65 –	.....
No. 1, 188 proof, dr	gal.	.58 –	.....
No. 5, 188 proof, bbl	gal.	.60 –	.....
No. 5, 188 proof, dr	gal.	.55 –	.....
Alum, ammonia, lump, bbl	lb.	.03½ –	.04
Potash, lump, bbl	lb.	.02½ –	.03½
Chrome, lump, potash, bbl	lb.	.05½ –	.06
Aluminum sulphate, com., bags	100 lb.	1.35 –	1.40
Iron free, bags	lb.	2.35 –	2.45
Aqua ammonia, 26°, drums	lb.	.06½ –	.06¾
Ammonia, anhydrous, cyl	lb.	.28 –	.30
Ammonium carbonate, powd., tech., casks	lb.	.12½ –	.12¾
Nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	3.35 –	3.65
Antimony oxide, white, bbl	lb.	.13 –	.14
Arsenic, white, powd., bbl	lb.	.06¼ –	.06½
Red, powd., kegs	lb.	.14½ –	.15½
Barium carbonate, bbl	ton	54.00 –	55.00
Chloride, bbl	ton	65.00 –	72.00
Dioxide, 88%, drums	lb.	.17½ –	.18
Nitrate, casks		.08½ –	.09
Blanc fixe, dry, bbl	lb.	.03¼ –	.03¾
Bleaching powder, f.o.b. wks., drums, contract	100 lb.	1.90 –	.....
Spot, wks., drums	100 lb.	2.00 –	2.15
Borax, bbl	lb.	.05 –	.05½
Bromine, cases	lb.	.44 –	.46
Calcium acetate, bags	100 lb.	3.00 –	3.05
Arsenate, dr	lb.	.08 –	.08½
Carbide, drums	lb.	.05 –	.05½
Chloride, fused, dr. wks	ton	21.00 –	.....
Gran. drums works	ton	27.00 –	.....
Phosphate, mono, bbl	lb.	.06½ –	.07½
Carbon bisulphide, drums	lb.	.06 –	.06½
Tetrachloride, drums	lb.	.06½ –	.07
Chalk, precip.—domestic, light, bbl	lb.	.04½ –	.04½
Imported, light, bbl	lb.	.04½ –	.05
Chlorine, liquid, tanks, wks	lb.	.04½ –	.....
Contract, tanks, wks	lb.	.04 –	.....
Cylinders, 100 lb., wks	lb.	.05½ –	.07½
Cobalt, oxide, bbl	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks	ton	15.00 –	16.00
Copper carbonate, bbl	lb.	.17 –	.17½
Cyanide, drums	lb.	.49 –	.50
Oxide, kegs	lb.	.16 –	.16½
Sulphate, dom., bbl	100 lb.	4.65 –	4.75
Imp. bbl	100 lb.	4.50 –	4.60
Cream of tartar, bbl	lb.	.20½ –	.21
Epsom salt, dom., bbl	100 lb.	1.75 –	2.00
Imp., tech., bags	100 lb.	1.35 –	1.40
U.S.P., dom., bbl	100 lb.	2.10 –	2.35
Ether, U.S.P., dr concent'd	lb.	.15 –	.16
Ethyl acetate, 85%, drums	gal.	.92 –	.95
Acetate, 99%, dr	gal.	1.08 –	1.10
Formaldehyde, 40%, bbl	lb.	.09 –	.09½
Fullers earth—f.o.b. mines	ton	7.50 –	18.00
Furfural, works, bbl	lb.	.25 –	.....
Fusel oil, ref., drums	gal.	4.00 –	4.50
Crude, drums	gal.	3.00 –	3.20
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Imp., bags	100 lb.	.85 –	.95
Glycerine, c. p., drums extra	lb.	.18½ –	.19
Crude 80%, loose	lb.	.11½ –	.12
Hexamethylene, drums	lb.	.66 –	.70
Lead:			
White basic carbonate, dry, casks	lb.	$0.10½ –	.....
White, basic sulphate, casks	lb.	.10 –	.....
White, in oil, kegs	lb.	.1240 –	.....
Red, dry, casks	lb.	.11½ –	.....
Red, in oil, kegs	lb.	1362 –	.....
Acetate, white crys., bbl	lb.	.15½ –	.....
Brown, broken, casks	lb.	.14½ –	.....
Arsenate, white crys., bbl	lb.	.16 –	$0.18
Lime-Hydrated, b.g., wks	ton	10.50 –	12.50
Bbl., wks	ton	18.00 –	19.00
Lump, bbl	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.11½ –	...
Lithopone, bags	lb.	.06 –	.06½
Magnesium carb., tech., bags	lb.	.07 –	.08
Methanol, 95%, bbl	gal.	.74 –	.76
97%, bbl	gal.	.76 –	.79
Pure, tanks	gal.	.76 –	.....
drums	gal.	.78 –	.80
bbl	gal.	.83 –	.85
Methyl-acetone, t'ks	gal.	.70 –	.....
Nickel salt, double, bbl	lb.	.10 –	.....
Single, bbl	lb.	.10½ –	.....
Orange mineral, csk	lb.	.14½ –	.14¾
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.70 –	.75
Yellow, cases	lb.	.37½ –	.40
Potassium bichromate, casks	lb.	.08½ –	.08¾
Bromide, gran., bbl	lb.	.42 –	.48
Carbonate, 80–85%, calcined, casks	lb.	.05 –	.05½
Chlorate, powd	lb.	.06½ –	.08½
Cyanide, drums	lb.	.47 –	.52
First sorts, cask	lb.	.08½ –	.08½
Hydroxide (caustic potash) drums	lb.	.07½ –	.....
Iodide, cases	lb.	3.65 –	3.75
Nitrate, bbl	lb.	.06 –	.07¼
Permanganate, drums	lb.	.14 –	.15
Prussiate, red, casks	lb.	.36½ –	.38
Prussiate, yellow, casks	lb.	.16½ –	.16¾
Salammoniac, white, gran., casks, imported	lb.	.06 –	.06½
White, gran., bbl., domestic	lb.	.07½ –	.08
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl	100 lb.	1.20 –	1.40
Salt cake (bulk) works	ton	16.00 –	18.00
Soda ash, light 58% flat, bulk, contract	100 lb.	1.25 –	.....
bags, contract	100 lb.	1.38 –	.....
Dense, bulk, contract, basis 58%	100 lb.	1.35 –	.....
bags, contract	100 lb.	1.45 –	.....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	.....
Caustic, ground and flake, contracts, dr	100 lb.	3.50 –	3.85
Caustic, solid, 76% f.a.s. N. Y	100 lb.	2.90 –	3.05
Sodium acetate, works, bbl	lb.	.05 –	.05¼
Bicarbonate, bulk	100 lb.	1.75 –	.....
Bichromate, casks	lb.	.06½ –	.06¾
Bisulphate (niter cake)	ton	6.00 –	7.00
Bisulphite, powd., U.S.P., bbl	lb.	.04½ –	.04¾
Chlorate, kegs	lb.	.06½ –	.06¾
Chloride	long ton	12.00 –	13.00
Cyanide, cases	lb.	.19 –	.22
Flouride, bbl	lb.	.08½ –	.09
Hyposulphite, bbl	lb.	.02½ –	.02¾
Nitrite, casks	lb.	.09½ –	.09¾
Peroxide, powd., cases	lb.	.23 –	.27
Phosphate, dibasic, bbl	lb.	.03½ –	.03¾
Prussiate, yel. bbl	lb.	.09¼ –	.09¾
Salicylate, drums	lb.	$0.38 –	$0.40
Silicate (40°, drums)	100 lb.	.75 –	1.16
Silicate (60°, drums)	100 lb.	1.75 –	2.00
Sulphide, fused, 60-62%, drums	lb.	.02½ –	.03½
Sulphite, crys., bbl	lb.	.03½ –	.03¾
Strontium nitrate, powd., bbl	lb.	.09 –	.09½
Sulphur chloride, yel drums	lb.	.04½ –	.05
Crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Flour, bag	100 lb.	2.25 –	2.35
Dioxide, liquid, cyl	lb.	.08 –	.08½
Tin bichloride, bbl	lb	.15 –	.15½
Oxide, bbl	lb.	.58 –	.58½
Crystals, bbl	lb.	.37½ –	.37¾
Zinc carbonate, bags	lb.	.12 –	.14
Chloride, gran., bags	lb.	.06 –	.07½
Cyanide, drums	lb.	.40 –	.41
Dust bbl	lb.	.08 –	.08½
Oxide, lead free, bags	lb.	.07½ –	.....
5% lead sulphate bags	lb.	.06½ –	.....
French, red seal, bags	lb.	.09½ –	.....
French, green seal, bags	lb.	.10½ –	.....
French, white seal, bbl	lb.	.11½ –	.....
Sulphate, bbl	100 lb.	3.25 –	3.50

Coal-Tar Products

Alpha-naphthol, crude, bbl	lb.	$0.60 –	$0.62
Alpha-naphthol, ref., bbl	lb.	.75 –	.80
Alpha-naphthylamine, bbl	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salt, bbl	lb.	.20 –	.22
Anthracene, 80%, drums	lb.	.70 –	.75
Anthraquinone, 25%, drums	lb.	.65 –	.70
Benzaldehyde U.S.P., tech., drums	lb.	.69 –	.71
Benzene, pure, tanks, works	gal.	.25 –	.....
Benzene, 90%, tanks, works	gal.	.23 –	.....
Benzidine base, bbl	lb.	.78 –	.80
Benzyl chloride, ref. carboys	lb.	.35 –	.....
Benzyl chloride, tech., drums	lb.	.25 –	.....
Beta-naphthol, tech., bbl	lb.	.24 –	.25
Beta-naphthylamine, tech	lb.	.65 –	.70
Cresylic acid, 97%, drums	gal.	.62 –	.64
95-97%, drums, works	gal.	.57 –	.59
Dichlorbenzene, drums	lb.	.07 –	.08½
Dinitrobenzene, bbl	lb.	.15 –	.17½
Dinitrochlorbenzene, bbl	lb.	.20 –	.21
Dinitrophenol, bbl	lb.	.35 –	.40
Dinitrotoluen, bbl	lb.	.18 –	.20
Dip oil, 25%, drums	gal.	.26 –	.28
H-acid, bbl	lb.	.70 –	.74
Meta-phenylenediamine, bbl	lb.	.90 –	.95
Monochlorbenzene, drums	lb.	.08½ –	.10
Naphthalene, flake, bbl	lb.	.05 –	.05½
Naphthionate of soda, bbl	lb.	.60 –	.65
Naphthionic acid, crude, bbl	lb.	.62 –	.63
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl	lb.	.25 –	.27
Nitro-toluene, drums	lb.	.13½ –	.14
N-W acid, bbl	lb.	1.10 –	1.20
Ortho-amidophenol, kegs	lb.	2.40 –	2.50
Ortho-dichlorbenzene, drums	lb.	.10 –	.11
Ortho-toluidine, bbl	lb.	.14 –	.15
Para-aminophenol, base, kegs	lb.	1.15 –	1.20
Para-dichlorbenzene, bbl	lb.	.17 –	.20
Para-nitraniline, bbl	lb.	.67 –	.68
Para-nitrotoluene, bbl	lb.	.40 –	.42
Para-phenylendiamine, bbl	lb.	1.30 –	1.35
Para-toluidine, bbl	lb.	.75 –	.80
Phenol, U.S.P., dr	lb.	.24 –	.26
Picric acid, bbl	lb.	.20 –	.22
Pitch, tanks, works	ton	27.00 –	30.00
Pyridine, imp., drums	gal.	4.00 –	4.15
Resorcinol, tech., kegs	lb.	1.30 –	1.40
Resorcinol, pure, kegs	lb.	2.00 –	2.25
R-salt, bbl	lb.	.50 –	.55
Salicylic acid, tech., bbl	lb.	.32 –	.33
Salicylic acid, U.S.P., bbl	lb.	.35 –	.....
Solvent naphtha, water-white, tanks	gal.	.24 –	.25
Crude, tanks	gal.	.21 –	.22
Sulphanilic acid, crude, bbl	lb.	.16 –	.18
Tolidine, bbl	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.26 –	.....
Toluene, drums, works	gal.	.31 –	.....
Xylidine, drums	lb.	.40 –	.42
Xylene, 5 deg.-tanks	gal.	.38 –	.40
Xylene, com., tanks	gal.	.25 –	.27

Naval Stores

Rosin B-D, bbl	280 lb.	$7.55 –	$7.65
Rosin E-I, bbl	280 lb.	7.65 –	7.75
Rosin K-N, bbl	280 lb.	7.70 –	7.75
Rosin W.G.-W.W., bbl	280 lb.	8.50 –	9.00
Turpentine, spirits of, bbl	gal.	.84 –	.85
Wood, steam dist., bbl	gal.	.78 –	.80
Wood, dest. dist., bbl	gal.	.70 –	.71
Pine tar pitch, bbl	200 lb.	5.50 –	.....
Tar, kiln burned, bbl	500 lb.	12.00 –	12.50
Rosin oil, first run, bbl	gal.	.45 –	.....
Pine tar oil, com'l	gal.	.30 –	.....

Animal Oils and Fats

Degras, bbl.	lb.	$0.03½ –	$0.05½
Grease, yellow, loose	lb.	.09 –	.09½
Lard oil, Extra No. 1, bbl.	gal.	.96 –	.98
Lard compound, bbl.	lb.	.13 –	13½
Neatsfootoil, 20 deg. bbl.	gal.	1.35 –	1.37
Oleo Stearine		.11½ –	
Oleo oil, No. 1, bbl.	lb.	.18 –	.18½
Red oil, distilled, d.p. bbl.	lb.	.11 –	.11½
Tallow, extra, loose works	lb.	.10 –	
Tallow oil, acidless, bbl.	gal.	.92 –	.94

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.17 –	$0.17½
Castor oil, No. 1, bbl.	lb.	.17½ –	17½
Chinawood oil, bbl.	lb.	.15½ –	.15½
Coconut oil, Ceylon, bbl.	lb.	.11½ –	.11¾
Ceylon, tanks, N. Y.	lb.	.10½ –	
Corn oil, crude, bbl.	lb.	.11½ –	.11¾
Crude, tanks, (f.o.b. mill)	lb.	.10½ –	
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.08½ –	.09
Summer yellow, bbl.	lb.	.11 –	.11¼
Linseed oil, raw, car lots, bbl.	gal.	1.07 –	
Raw, tank cars (dom.)	gal.	1.01 –	
Boiled, cars, bbl. (dom.)	gal.	1.09 –	
Olive oil, denatured, bbl.	gal.	1.18 –	1.22
Sulphur, (foots) bbl.	lb.	.09½ –	.09½
Palm, Lagos, casks	lb.	.09½ –	.09¾
Niger, casks	lb.	.08½ –	.08¾
Palm kernel, bbl.	lb.	.10½ –	.10½
Peanut oil, crude, tanks (mill)	lb.	.12 –	
Refined, bbl.	lb.	.16 –	.16½
Perilla, bbl.	lb.	.14½ –	.14¾
Rapeseed oil, refined, bbl.	gal.	.98 –	1.01
Sesame, bbl.	lb.	.14½ –	.14½
Soya bean (Manchurian), bbl	lb.	.13 –	
Tank, f.o.b. Pacific Coast	lb.	.11½ –	.12

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.64 –	$0.66
Menhaden, light pressed, bbl.	gal.	.70 –	.72
White bleached, bbl.	gal.	.72 –	.74
Crude, tanks (f.o.b. factory)	gal.	.55 –	.58
Whale No. 1 crude, tanks, coast	lb.	–	
Winter, natural, bbl.	gal.	.75 –	.76
Winter, bleached, bbl.	gal.	.78 –	.79

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.50 –	$0.55
Albumen, egg, tech, kegs	lb.	.90 –	.95
Cochineal, bags	lb.	.33 –	.35
Cutch, Borneo, bales	lb.	.04½ –	.05
Rangoon, bales	lb.	.13 –	13½
Dextrine, corn, bags 100	lb.	4.52 –	4.79
Gum, bags 100	lb.	4.82 –	5.09
Divi-divi, bags	ton	42.00 –	43.00
Fustic, sticks	ton	30.00 –	35.00
Chips, bags	lb.	.04 –	.05
Gambier com., bags	lb.	.18 –	.18½
Logwood, sticks	ton	25.00 –	26.00
Chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	150 00 –	160.00
Domestic, bags	ton	50.00 –	55.00
Starch, corn, bags 100	lb.	3.87 –	4.14

Extracts

Archil, conc., bbl.	lb.	$0.16 –	$0.19
Chestnut, 25% tannin, tanks	lb.	.01½ –	.02½
Divi-divi, 25% tannin, bbl.	lb.	.05 –	.05
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09½
Gambier, liq., 25% tannin, bbl.	lb.	.11 –	.11
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, liquid, 51°, bbl.	lb.	.12 –	.13
Logwood, crys., bbl.	lb.	.14 –	.15
Liq., 51°, bbl.	lb.	.07½ –	.08½
Osage Orange, 51°, liquid, bbl.	lb.	.07 –	.08
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.04¾
Sumac, dom., 51°, bbl.	lb.	.06¼ –	.06¾

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.09 –	$0.11
spot, cases	lb.	.12 –	.16
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Prussian, bbl.	lb.	.35 –	.37
Ultramarine, bbl.	lb.	.07 –	.35
Browns, Sienna, Ital., bbl.	lb.	.05 –	.12
Sienna, Domestic, bbl.	lb.	.03 –	.03½
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens-Chrome, C.P.Light, bbl.	lb.	.28 –	.30
Chrome, commercial, bbl.	lb.	.10½ –	.11½
Paris, bulk	lb.	.24 –	.26
Reds, Carmine No. 40, tins	lb.	4.25 –	4.50
Iron oxide red, casks	lb.	.08 –	.12
Para toner, kegs	lb.	.95 –	1.00
Vermilion, English, bbl.	lb.	1.25 –	1.30
Yellow, Chrome, C.P. bbls.	lb.	.17 –	.17½
Ocher, French, casks	lb.	.02 –	.03

Waxes

Beeswax, crude, Afr. bg.	lb.	$0.32 –	$0.32½
Refined, light, bags	lb.	.35 –	.36
Candellila, bags	lb.	.28 –	.28½
Carnauba, No. 1, bags	lb.	.36 –	.37
No. 2, North Country, bags	lb.	.28 –	.29
No. 3, North Country, bags	lb.	.24 –	.25
Japan, cases	lb.	$0.15½ –	$0.16
Montan, crude, bags	lb.	.06 –	.06½
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.06 –	.06½
Crude, scale 124-126 m.p. bags	lb.	.05½ –	
Ref., 118-120 m.p. bags	lb.	.05½ –	.06
Ref., 123-125 m.p., bags	lb.	.06 –	.06½
Stearic acid, sgle. pressed, bags	lb.	.11 –	.11½
Double pressed, bags	lb.	.11½ –	.12

Fertilizers

Acid phosphate, 16% wks.	ton	$7.50 –	$7.75
Ammonium sulphate, bulk f.o.b. works 100	lb.	2.70 –	
Blood, dried, bulk	unit	3.85 –	3.95
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	4.75 –	
Nitrate of soda, bags 100	lb.	2.42½ –	
Tankage, high grade, f.o.b. Chicago	unit	3.00 –	3.25
Phosphate rock, f.o.b. mines			
Florida pebble, 68-72%	ton	3.00 –	3.50
Tennessee, 75%	ton	6.50 –	6.75
Potassium muriate, 80%, bags	ton	34.55 –	
Sulphate, bags, 90%	ton	45.85 –	
Double manure salt, bgs.	ton	26.35 –	
Kainit, 14%, bgs	ton	10.25 –	

Crude Rubber

Para—Upriver fine	lb.	$0.34½ –	0.34½
Upriver coarse	lb.	.24 –	.24½
Plantation—First latex crepe	lb.	.34½ –	
Ribbed smoked sheets	lb.	.34½ –	

Gums

Copal, Congo, amber, bags	lb.	$0.08 –	$0.10
East Indian, bold, bags	lb.	.13 –	.14
Manila, amber, bags	lb.	.14 –	.16
Damar, Batavia, cases	lb.	.27 –	.28
Singapore, No. 1, cases	lb.	.29 –	.29½
Singapore, No. 2, cases	lb.	.20 –	.21
Kauri, No. 1, cases	lb.	.58 –	.64
Ordinary chips, cases	lb.	.21 –	.22
Manjak, Barbados, bags	lb.	.06 –	.12

Shellac

Shellac, orange fine, bags	lb.	$0.66 –	$0.67
Orange superfine, bags	lb.	.68 –	.69
Bleached, bonedry	lb.	.75 –	.76
T. N., bags	lb.	.65 –	.66

Miscellaneous Materials

Asbestos, crude No. 1 f.o.b., Quebec sh. ton		$300 00–	$350.00
Shingle, f.o.b., Quebec sh. ton		50.00 –	60.00
Cement, f.o.b., Quebec sh. ton		15.00 –	20.00
Barytes, grd., white, f.o.b. mills, bbl. net ton		17.00 –	17.50
Grd., off-color, f.o.b., Balt net ton		13.00 –	14.00
Floated, f.o.b., St. Louis, bbl. net ton		23.00 –	24.00
Crude f.o.b. mines, bulk net ton		8.50 –	9.00
Casein, bbl., tech. lb		.10½ –	.12
China clay (kaolin) crude, No. 1, f.o.b. Ga. net ton		7.00 –	8.00
Powd., f.o.b. Ga. net ton		12.00 –	16.00
Crude, f.o.b. Va. net ton		6.00 –	8.00
Ground, f.o.b. Va. net ton		10.00 –	20.00
Imp., powd. net ton		45.00 –	50.00
Feldspar, No. 1 f.o.b. N.C. long ton		6.50 –	7.25
No. 2 f.o.b. N.C. long ton		4.50 –	5.00
No. 1 gr'd. Me. long ton		19.00 –	20.00
No. 1 Can., f.o.b., mill, powd. long ton		25.00 –	
Graphite, Ceylon, lump, first quality, bbl.	lb.	.05½ –	.06
High grade amorphous crude	ton	15.00 –	35.00
Gum arabic, amber, sorts, bags	lb.	.12 –	.12½
Tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.15 –	1.20
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N.Y.	ton	50.00 –	55.00
Magnesite, calcined	ton	35.00 –	42.50
Pumice stone, imp., casks	lb.	.03 –	.40
Dom., lump, bbl.	lb.	.06 –	.08
Dom., ground, bbl.	lb.	.03 –	.05
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.25
Sand blast, f.o.b. Ind.	ton	2.25 –	3.50
Amorphous, 200-mesh, f.o.b. Ill.	ton	20.00 –	
Glass sand, f.o.b. Ill.	ton	2.00 –	2.25
Soapstone, coarse, f.o.b., Vt., bags	ton	7.50 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	10.50 –	
200 mesh, f.o.b., Ga.	ton	9.50 –	10.00
325 mesh, f.o.b. New York, grade A	ton	14.75 –	

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 –	$2.85
Corning	bbl.	1.50 –	
Cabell	bbl.	1.45 –	
Somerset	bbl.	1.55 –	
Illinois	bbl.	1.37 –	
Indiana	bbl.	1.38 –	
Kansas and Okla. under 28 deg.	bbl.	.75 –	.85
California, 35 deg. and up	bbl.	1.40 –	

Gasoline, Etc.

Motor gasoline steel bbls.	gal.	$0.15 –	
Naphtha, V. M. & P. deod, steel bbls.	gal.	.14 –	
Kerosene, ref. tank wagon	gal.	.13 –	
Bulk, W.W. delivered, N.Y.	gal.	.08½ –	
Lubricating oils:			
Cylinder, Penn., filtered	gal.	.34 –	$0.35
Bloomless, 30@ 31 grav.	gal.	.24 –	
Paraffin, pale 885 vis.	gal.	.16½ –	.17
Spindle, 200, pale	gal.	.25 –	.26
Petrolatum, amber, bbls.	lb.	.04 –	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–$145
Chrome brick, f.o.b. Eastern shipping points	ton	45–47
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	40–43
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	33–37
Magnesite brick, 9-in. straight (f.o.b. wks)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48–50
9-in. sizes, f.o.b., Birmingham	1,000	48–50
F.o.b. Mt. Union, Pa.	1,000	33–35
Silicon carbide refract brick, 9-in.	1,000	1,180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, ton		$200.00 –
Ferrochromium, per lb. of Cr, 1-2% C.	lb.	.30 –
4-6% C	lb.	.10½ – .11
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	105.00 –
Spiegeleisen, 19-21% Mn.	gr. ton	33.00 – 35.00
Ferromolybdenum, 50-60% Mo, per lb. Mo.	lb.	1.80 – 2.00
Ferrosilicon, 10-12%	gr. ton	39.50 – 43.50
50%	gr. ton	72.00 – 75.00
Ferrotungsten, 70-80% per lb. of W.	lb.	.88 – .90
Ferro-uranium, 35-50%, of U, per lb. of U.	lb.	4.50 –
Ferrovanadium, 30-40%, per lb. of V.	lb.	3.50 – 4.00

Ores and Mineral Products

Bauxite, dom. crushed, dried, f.o.b. shipping points	ton	$5.50 –	$8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 –	
C.i.f. Atlantic seaboard	ton	18.50 –	24.00
Coke, fdry., f.o.b. ovens	ton	4.00 –	4.50
Coke, furnace, f.o.b. ovens	ton	3.10 –	3.15
Fluorspar, gravel, f.o.b. mines, Illinois	ton	17.50 –	18.50
Ilmenite, 52% TiO_2 Va.	lb.	.01½ –	
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.39 –	.41
Manganese ore, chemical (MnO_2)	ton	75.00 –	80.00
Molybdenite 85% MoS_2, per lb. Mo S_2, N. Y.	lb.	.70 –	.75
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 –	.08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½ –	.12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.12 –	
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –	
Rutile, 94@ 96% TiO_2	lb.	.12 –	.15
Tungsten ore, scheelite, 60% WO_3 and over	unit	9.00 –	9.25
Tungsten, wolframite, white, 60% WO_3	unit	8.75 –	
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 –	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 –	12.50
Vanadium pentoxide, 76%	lb.	3.00 –	3.25
Vanadium ore, per lb. V_2O_5	lb.	1.00 –	1.25
Zircon, 99%	lb.	.06 –	.07

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.14 – $0.14½
Aluminum, 98 to 99%	lb.	.27 – .28
Antimony, wholesale, Chinese and Japanese	lb.	.14½ – .14½
Nickel, 99%	lb.	.29 – .33
Monel metal	lb.	.32
Tin, 5-ton lots, Straits	lb.	.54½
Lead, New York, spot	lb.	.0865
Zinc, spot, New York	lb.	.0720
Silver (commercial)	oz.	.69½
Cadmium	lb.	.60– .62
Bismuth (500 lb. lots.)	lb.	1.50–1.55
Cobalt	lb.	2.50–3.00
Magnesium, ingots, 99%	lb.	.90–95
Platinum, refined	oz.	117.00
Mercury 75	lb.	69.00–69.50
Tungsten powder	lb.	.95–1.00

Industrial Developments of the Week

New Construction and Machinery Requirements in the Process Industries

Some Opportunities This Week

Aluminum.....Manitowoc, Wis.
Cement.....Chattanooga, Tenn.
Chemicals.....Witmer, Pa.
Chemicals.....Capelton, Que.
Chemistry.....Lexington, Ky.
Evaporator.....Goderich, Ont.
Gas.....Los Angeles, Calif.
Gas.....Toronto, Ont.
Glass.....James City, Pa..
Glue, Soap & Tallow..San Francisco, Calif.
Lubricating Oils.....Gananoque, Ont.
Paper.....Philadelphia, Pa.
Pulp and Paper.....Ballston, N. Y.
Sugar.....Alberta, Canada

This page is of value not only as a machinery market but also as an index of the general activity and growth of the industries served by Chem. & Met. The reports are gathered by our regular correspondents who are instructed to verify every detail. Requirements for new machinery will be published here free of charge.

New England

Vt., Fair Haven—Vermont Milling Products Co., manufacturers of ground slate for roofing purposes, etc., plant recently destroyed by fire, with loss estimated at $400,000 including machinery.

Middle Atlanta

N. Y., Ballston—The Iroquois Pulp & Paper Co., Thomson, is receiving bids for the construction of a 2 story, 48 x 150 ft. addition to its plant here, estimated cost $110,000 with machinery. C. E. Eaton, Trust Company Bldg., Watertown, is architect. L. Waite is secretary and treasurer.

Pa., Braddock—Amer. Steel & Wire Co., Frick Bldg., Pittsburgh, awarded the general contract for the construction of an acid loading plant on Monongahela River, to Enterprise Construction Co., Jackson Bldg., Pittsburgh.

Pa., James City — Pennsylvania Plate Glass Co., is in the market for 36 grinding and polishing machines.

Pa., Philadelphia — Philadelphia Paper Mfg. Co. awarded the contract for the construction of a 1 story, 120 x 200 ft. factory at Nixon and Franklin Sts., to Hughes-Foulkrod Co., Commonwealth Bldg. Estimated cost $78,000.

Pa., Witmer—Ball Chemical Co., Fulton Bldg., Pittsburgh, has awarded general contract for the construction of a 2 story factory near Etna, to Inland Construction Co., 5612 Pennsylvania Ave., Pittsburgh. Estimated cost $40,000.

South

Ky., Lexington—University of Ky., F. L. McVey, Pres., will receive bids until Jan. 2 for the construction of an addition and alterations to the new chemistry building.

Tenn., Chattanooga—The Signal Mountain Portland Cement Co., C. S. Stewart, Vice-Pres., plans to increase production capacity in January.

Tenn., Knoxville—Indian Refining Co., Oak St. Bridge, have plans under way for a 10 x 12 ft. pump house, loading rack, elevating storage tanks, equipment, etc., to replace fire loss. L. J. Slattery, Indian Refining Co., Lawrenceville, Ill., is engineer for construction.

Middle West

Wis., Manitowoc—Aluminum Goods Mfg. Co., 15th and Franklin Sts., G. Vits, Pres., awarded the contract for the construction of a 7 story, 300 x 60 ft. warehouse and manufacturing plant, also a power plant, to W. W. Oeflein, Inc., 86 Michigan St., Milwaukee. Estimated cost $350,000.

West of Mississippi

Minn., Aurora—Bd. of Education, C. C. Block, Clk., will receive bids until Dec. 15 for chlorinating machine for sterilizing high school swimming pool, capacity 60,000 gal.

Far West

Calif., Los Angeles — California Compressed Gas Co., 2311 East 52nd St., manufacturers of gases, Purox, oxygen and hydrogen, oxy-hydrogen and oxy-acetylene welding and sheet cutting apparatus, awarded the contract for the construction of a 1 story, 50 x 100 ft. factory on Fickett St., to Hockensmith Engineering & Construction Co., 2732 Glendale Blvd.

Calif., Los Angeles—Morgan, Walls & Clements, Van Nuys Bldg., Archts., are receiving bids for the construction of a 4 story, 200 x 200 ft. warehouse on San Fernando Rd., for W. P. Fuller Co., 135 North Los Angeles St., manufacturers of paint. Estimated cost $300,000.

Calif., Los Angeles—Philadelphia Quartz Co., 3210 East 26th St., awarded the contract for the construction of a 1 story, 50 x 60 ft. factory on East 26th St., to Austin Co., 777 East Washington St.

Calif., San Francisco — California Glue, Soap & Tallow Co., Fairfax and Rankin Sts., is having plans prepared for the construction of a 2 story factory on 12th St. near Folsom St., estimated cost $100,000. O'Brien Bros., Inc., 315 Montgomery St., are architects.

Canada

Canada, Alberta — The Utah, Idaho Sugar Co., Salt Lake City, Utah, B. R. Smoot, Gen. Supt., will soon receive bids for the construction of a large sugar beet factory here, estimated cost $1,500,000 with machinery.

Ont., Gananoque—St. Laurence Oil & Supply Co., Ltd., G. D. Gilbert, Purch. Agt., is in the market for equipment for the manufacture of lubricating oils and by-products.

Ont., Goderich—Goderich Evaporator Co., Cheer & Mumby, Propprs., plans to rebuild plant recently destroyed by fire, and are interested in prices on equipment.

Ont., Toronto—Consumers Gas Co., Adelaide St. E., plans the construction of a gas retort building at the foot of Berkeley St., estimated cost $750,000.

Que., Capelton—Nichols Chemical Co., Ltd., plans to rebuild sulphuric plant recently destroyed by fire.

Unverified

Ga., Calhoun—The Calhoun Oil Mill, has tentative plans under way for rebuilding a portion of its plant which was recently destroyed by fire with loss estimated at $50,000 including equipment.

Mich., Petoskey—Petoskey Cement Co. is having plans prepared for additions to factory to double the present capacity, estimated cost $400,000 with equipment.

Incorporations

Rourke-Eno Paper Co., Inc., Hartford, Conn.—W. H. Rourke, Pres.-Treas.; F. H. Eno, Vice-Pres.; B. VanSchaack, Secy.; D. L. Rourke, Asst. Secy.; W. E. A. Bulkeley, W. H. Bulkeley and A. W. Erdman, Jr., Bd. of Directors.

Blakeley Oil & Gas Co., Wilmington, Del., producing, $200,000. (Corporation Trust Co. of America.)

Domestic Coal Co., Wilmington, Del., manufacture coke, $10,000. (Corporation Service Co.)

Raezer Drug Co., manufacture, $200,000; G. B. Raezer, L. R. Raezer, E. B. Ruth, Lititz, Pa. (Capital Trust Co. of Delaware.)

Simpson Carbonization Co., Wilmington, Del., $6,000,000. (Corporation Trust Co. of America.)

Dunbar Molasses & Syrup Co., Inc., 3300 Chartres St., New Orleans, La., $100,000; M. Levin, Pres., J. L. Rothschild, Sec.-Treas.

Maryland Varnish Products Co., 817 Winston Ave., Baltimore, Md., $25,000; H. A. Jackson, H. A. Rhodes and others.

Josef Weis Laboratories, Inc., 110 South Calvert St., Baltimore, Md., $100,000; J. Weis, R. S. Baldwin and others.

Scheiber Concrete Roof Tile Co., St. Louis, Mo., $50,000; P. C. Scheiber, Pres., F. C. Scheiber, 3208 Dodier St., St. Louis, Mo., Agent.

Western Brick & Clay Products Co., Kansas City, Mo., R. W. Vail, 1316 East 29th St., O. E. Morrison and others.

Eternite Chemical Products Corp., New York City, $10,000; D. Hogan, M. Luftman, 1292 South Boulevard. (Attorney, A. Ginsberg, 132 Nassau St.)

P. T. Chemical Co., New York City, $20,000; G. & M. Well, J. Gensler. (Attorney D. J. Goldberg, 276 5th Ave.)

Westphals Preparations, New York City, cosmetics, $15,000; B. Sirota, H. Stiglitz, S. Meisler, (Attorney, W. H. Stiglitz, 1133 Broadway.)

Wichita Refining Co., Wichita Falls, Tex., $25,000; B. D. Dawson, J. E. Parker, E. F. Griswold.